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SUMMARY OF RECENT ABSTRACTS*

VI. PLAGUE

General: Epidemiology

A small outbreak of plague in Ajaccio, Corsica, the first for a great many years, is described by BERNARD *et al.* (p. 736). It was evidently introduced by sea. Control measures included compulsory inoculation with plague vaccine of all the 25,000 inhabitants of Ajaccio.

GREVAL (p. 33) introduces a series of papers which refer to the reappearance in 1948 of plague in Calcutta, which had been free from it since 1926. A study of this outbreak was made by LAL and SEAL (p. 33), who report that the infection spread widely and rapidly, with a case-mortality rate of 11·5 per cent. (sulphonamides were used). In the later stages most cases were mild. Rats were heavily infected, and the flea index was high when the outbreak was at its height. ROY (p. 34) contributes a note on the fleas and rats concerned in this outbreak. PANJA and GUPTA (S. K.) (p. 34) isolated *P. pestis* from gland puncture material in several patients, but only in the early stages of the outbreak, when the cases were severe. They found that sera of bacteriologically positive cases contained agglutinins against newly isolated strains of the organism. GUPTA (A. K. D.) (p. 35) notes that streptomycin, sulphadiazine and sulphamethazine were used, but it was not possible to express an opinion as to their relative merits. For control the chief measures adopted were isolation and treatment of patients, the use of DDT, investigation of rats and mass inoculation (AHMAD, p. 35). An assessment of the immunizing power of the vaccine used (from the Haffkine Institute, Bombay) was attempted by PATEL and REBELLO (p. 35), who quote figures which indicate a considerably lower incidence of cases, and a lower death rate, in the inoculated than in comparable controls. The lowest case-mortality rate was in those inoculated 16–30 days before the onset of the attack.

POLLITZER (p. 256) gives an account of plague and its control in China, which should be read in the original.

ISAAC RIAZ (p. 255) traces the history of plague in Venezuela from 1908, when it entered a port, to 1919, when it disappeared from urban areas and became a rural infection, and to the present time when it is confined to certain rural districts. Outbreaks still occur every few years.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1949, v. 46. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Reservoirs : Vectors

DAVIS (p. 31) gives an account of plague in the animals of S. Africa, which spread from towns to field rodents in 1912, and of which the gerbils now form the chief reservoirs. They infect the semi-domestic *Mastomys coucha*, which in turn infect domestic rats or man, but though many rural outbreaks of human plague have occurred, urban plague has recently been rare.

Alberta is the only province of Canada which is free from rats, and though they have been reported there from time to time, they have always been detected and destroyed. BROWN (p. 142) points out that the existence of plague in the prairie gophers of the province indicates that the introduction of rats would entail serious risk of human disease.

In 3,271 rodents trapped or shot in one county of New Mexico, LINK (p. 1144) found evidence of plague only in prairie dogs (*Cynomys gunnisoni*) and marmots (*Marmota flaviventris*) or their fleas. No human cases have been reported, and there is little risk of human infection, because of the absence of domestic rats. MEYER and HOLDENRIED (p. 630) describe the investigations they made in two ranches in California on which rat plague had been observed. The infection was apparently spread from ground squirrel to the rat, and from rat to rat, by the fleas *Diamanus montanus* and *Hoplopsyllus anomalus*. The flea *X. cheopis* was completely absent. The authors stress the importance of effective rat control in places where plague occurs in wild rodents.

HÉRIVAUX and TOUMANOFF (p. 357) made regular collections of fleas in houses in Saigon during an epidemic of plague ; *X. cheopis* is the principal vector there. They conclude that the flea index calculated from such a survey is more useful in assessing the risks of plague transmission than the more usual *cheopis* index. *Xenopsylla* species were more common than *Ctenocephalides* species during the epidemic, but not at other times.

FAVAREL (p. 357) was unable to find that the human louse played any part in the transmission of plague in Madagascar.

BUXTON (p. 31) has investigated the growth and development of *Xenopsylla cheopis* when maintained on baby mice rather than on adult mice. The fleas feed readily, but do not produce so many eggs as those fed on adults, nor produce them so quickly. Adult mice, however, consistently kill more fleas than baby mice. Fleas fed on baby mice evidently lack some substance, which may be a mammalian sex hormone.

In an experiment on the water relations of the larva of *Xenopsylla cheopis*, SHARIF (p. 32) shows that the chief source of gain of water of the larva si ts food. The details of the experiment should be sought in the original.

Aetiology

On three occasions TCHAN (p. 736) has succeeded in cultivating *P. pestis* from a single organism.

BLANC (p. 461) has proved that *P. pestis* may remain alive and virulent for as long as 941 days in infected fleas preserved *in vacuo* in ampoules. It is also known that infected flea faeces may remain infective for 16 months, and that dead fleas may remain infective for 150 days in the dry state. The epidemiological significance of these findings can only be estimated by a study of survival of the organisms under natural conditions.

Cultures of *P. pestis* on agar, stored at 5–10°C., were found by FRANCIS (p. 630) to be alive and virulent 25 years later.

CHEN (p. 1143) has found that 3 of 53 strains of *P. pestis* preserved in California were glycerin positive, in that they produced acid in culture media containing glycerin. Most strains tested from Asia and Russia have been glycerin positive, but those from the rest of the world have been glycerin negative. The two

forms do not, apparently, often occur together, but the significance of this is not yet clear.

ROCKENMACHER (p. 825) has shown that the catalase activity of virulent strains of *P. pestis* is significantly greater than for non-virulent strains; this may provide the basis for determining virulence *in vitro*.

GUNNISON and LAZARUS (p. 460) have investigated the changes which occur in *P. pestis* bacteriophage after transfer on other organisms. The original should be consulted. P'AN, TCHAN and POCHON (p. 1029) have studied the cytology of *P. pestis* under the influence of bacteriophage; their findings should be studied in full.

Treatment

POLLITZER (p. 934) sums up recent trends in treatment, commenting on the value of the sulphonamides and streptomycin, and making the point that serum, especially the new purified rabbit serum, adds to the efficacy of treatment with other substances. Sulphonamides are used as prophylactics for persons in contact with pneumonic plague. Killed vaccines are undoubtedly useful, and live vaccines may be suitable for general use if they can be made available in stable, lyophilized form. Purified crystalline antigens may also be useful.

As a result of an analysis of results of treatment in a considerable number of cases of plague, WAGLE (p. 141) concludes that sulphadiazine is the best of the sulphonamides, but that streptomycin is at present the most effective drug. He gives details of the dosages used. KARAMCHANDANI and RAO (p. 545) have treated plague with streptomycin, and write favourably of its action, but their presentation of the case for streptomycin is criticized on statistical grounds by HILL, who also criticizes figures they quote in relation to the value of anti-plague inoculation.

SEAL (p. 934) gives an account of two outbreaks of pneumonic plague in India. In one, 12 members of a family community of 31 were affected, and only one recovered (he was treated in hospital, with streptomycin). The incubation period was about 2 days, and the duration of illness to death was 2–5 days. There were few physical signs, and little sputum, and this was rarely blood-stained. In the other outbreaks 10 of 18 members of a family were attacked, and all died. The outbreaks soon died out, as is usually the case, suggesting that in this form of transmission from man to man the organisms soon lose virulence. A case of pneumonic plague in which recovery followed treatment with streptomycin, sulphadiazine or sulphathiazole, anti-plague serum and penicillin, is reported by LEWIN *et al.* (p. 255). WAGLE and BEDARKAR (p. 358) obtained 5 cures in 6 patients with pneumonic plague treated with intramuscular streptomycin (0·66 gm. every 4 hours until clinical improvement was observed) and anti-plague serum of sulphamerazine.

Rodent control

THOMPSON (p. 141) has developed a technique for observing marked rats taking plain or poisoned bait, which may provide a method for estimating a population of wild rats. A study of the amounts and concentrations of 8 rat poisons which would be accepted in food by wild *Rattus norvegicus*, and of the lethal effect of these concentrations, has been made by DIEKE (p. 461).

GRATCH *et al.* (p. 737) make a useful point when they show that sodium fluoroacetate does not interfere with the bacteriological examination of rats poisoned with it; *P. pestis* can be cultivated from them or from rats poisoned with HCN.

A powder containing 50 per cent. DDT is lethal to about 80 per cent. of the rats round whose burrows it is spread (SERGENT and SERGENT, p. 738).

The rodents found in Rangoon are detailed by HARRISON and WOODVILLE (p. 256), who found plague in *Rattus rattus* and *Bandicota bengalensis*. They think that rat destruction by barium carbonate is not likely to make any real impression on the rat population, and previous experience of trapping indicates that it also is not likely to be very useful.

In the region of Lake Albert, Belgian Congo, organized rat-catching seems to have increased rather than decreased the rat population, but to have diminished the rat-flea population. DEVIGNAT (p. 737) states that it is a useful procedure in that examination of caught rats by injection of bone marrow into guineapigs reveals the infection, and when this is found inoculation of persons at risk with live vaccine is widely practised. The author thinks that the protection afforded is considerable.

DAVIS and FALES (p. 825) have made a survey of the distribution of *Rattus norvegicus* in Baltimore, where, probably as a result of anti-rat measures taken, the number has greatly diminished since 1944. *Charles Wilcocks*

MALARIA

MORUZZI, T. La malaria a Saseno. [**Malaria in Saseno.**] *Riv. di Malariologia.* 1949, Oct., v. 28, No. 5, 291–8. English summary (3 lines).

From the first world war till 1943, the Isle of Saseno in the Bay of Valona, Albania, was in Italian occupation and constituted a naval base for the defence of Italy. During this period the wild rocky islet was transformed. A network of roads linked the numerous buildings and land was brought under cultivation. A bare rocky ridge some 5 kilometres long traverses the longest diameter of the isle, from north to south: it attains a maximum height of 331 metres. Another lesser ridge is thickly covered with conifers and oak trees, with a luxuriant growth of broom.

Malaria occurred in the garrison from the early days of the occupation: in 1916, 43 cases; 1917, 30; 1918, 43 cases. But there was evidence that these infections were not contracted on the isle; Valona was the source of infection. In 1937 there were 17 primary infections, all *P. falciparum*, with 3 deaths from pernicious malaria: it was then suspected that some anophelines were breeding on the isle.

Details are given of the malaria incidence in the four years 1939–42. The maximum incidence was in 1940 when 51 primary cases and 12 relapses were recorded among a population of 743: 38 of the primary infections were *P. vivax*, 10 *P. falciparum*, and 3 unspecified. In 1940, anophelines were found breeding on the eastern side of the isle, and specimens of adult *A. maculipennis typicus*, *A. sacharovi* and *A. claviger* were captured.

The distribution of prophylactic drugs was the chief measure of control employed. *Norman White*

GUERRIERI, P. Le paludisme sera-t-il l'éternel fléau algérien? [**Will Malaria always be an Algerian Scourge?**] *Rev. Paludisme et Méd. Trop.* 1950, Jan. 15, v. 8, No. 68, 12–19, 1 graph.

The author refers to three severe epidemics that have afflicted Algeria in recent years: typhus fever in 1942, relapsing fever in 1945 and malaria in 1946. The mortality rates were high in all three epidemics but malaria was responsible for many more deaths than the other two epidemics. Mortality figures for the Zemmora Commune, with a population of 40,000, are presented in graphic

form, for the years 1939 to 1947. The graph shows well the excessive malaria mortality that marked the closing months of 1946. The rainfall in May and June of that year had been excessive.

At the moment malaria endemicity in that Commune is back at its normal low level but the danger of further grave epidemics continues. The persistence of malaria is largely attributable to carelessness and neglect of the most simple sanitary precautions in the *douars* (Arab encampments) and elsewhere. Costly irrigation schemes bring abundant crops but neglected irrigation ditches increase malaria hazards. Imported labour brings fresh strains of infection. The populace still looks upon malaria as inevitable. The author calls for much more energetic action and the stricter enforcement of sanitary rules and regulations to combat this much the most important cause of morbidity and mortality in Algeria. *Norman White*

BALICE, A. L'anofelismo nella provincia di Ascoli Piceno. [*Anopheles* **in the Province of Ascoli Piceno.**] *Riv. di Parassit.* Rome. 1950, Mar., v. 11, No. 1, 37–42, 2 figs. & 1 map.

The English summary appended to the paper is as follows :—

" The occurrence of some cases of primitive autochthonous malaria in the territory of Fermo's country, previously free of malaria, led the author to the study of the *Anopheles* fauna of the province of Ascoli Piceno.

" The Anopheles found were : *A. maculipennis maculipennis*, *A. labranchiae atroparvus*, *A. superpictus*."

GARRETT-JONES, C. **A Dispersion of Mosquitoes by Wind.** [Correspondence.] *Nature.* 1950, Feb. 18, 285.

This communication comments on two mass migrations of *Anopheles pharoensis* which occurred in the western desert of Egypt in 1942. The nearest breeding places were 18–28 miles north-east of the area of invasion. The swarms were probably wind-borne and both occurred at full moon. *H. S. Leeson*

MATTINGLY, P. F. **Studies on West African Forest Mosquitos. Part II. The Less Commonly Occurring Species.** *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 387–402, 3 figs. [12 refs.]

The following is the author's summary :—

" The present paper is the second of two dealing with field studies carried out near Lagos, Nigeria. The first paper covered four of the most abundant species encountered and the second is concerned with the remaining forty-eight. These are listed and the data relating to the thirty-eight least abundant, with the exception of two which were taken as males only, are given in tabular form. The other ten are dealt with at greater length. Males of twenty-six species were taken and in the case of three of these species they were so abundant as to create the impression that a swarming activity was involved. In the case of the ten more abundant species seasonal distribution curves are given based on average monthly catches and an attempt is made to relate these to variations in rainfall. The biting curves which are next discussed show a greater variety of types than those described in the first paper. In general, they are characterised by a fairly sharp peak associated with morning or evening twilight, but some have a more or less pronounced peak at both ends of the cycle and so correspond to the " eo-crepuscular " type of Haddow (1945). *Anopheles paludis*, like *Taeniorhynchus africanus* (described in the first paper) has an ill-defined period of maximum activity during the middle of the night. The

necessity of sub-dividing the figures in order to obtain a picture of the vertical distribution of the various species led in one or two cases to anomalous results, but in general a clear and fairly convincing picture was obtained. None of the species dealt with in the present paper was sufficiently abundant to afford reliable data on hourly variations in vertical distribution. In the general discussion, which embodies such inferences as it has seemed permissible to draw from the data, attention is drawn to the fact that the so-called " biting cycle " does not, in all likelihood, depend exclusively on variations in the urge to bite, but is more probably an expression of cyclical changes taking place in the general level of activity of the mosquito. The possible relationship of such changes to changes of a similar kind in the physical environment is discussed, and it is pointed out that intrinsic rhythms in the mosquito, perhaps related to the breeding cycle, may also be involved. Some data are presented which, while partly explained by the presence of a sibling species, may also indicate an interrelationship between the breeding cycle and vertical distribution." [See also this *Bulletin*, 1950, v. 47, 304.]

VILAIN, M. Liste des espèces anophéliennes rencontrées à Bobo-Dioulasso. [**Anopheline Species found at Bobo-Dioulasso.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 371–4.

Notes are given on the following anophelines collected in or near Bobo-Dioulasso, French West Africa, since 1947 : *Anopheles gambiae, A. funestus, A. rufipes, A. pretoriensis, A. maculipalpis* (larvae only), *A. nili* and *A. coustani* (larvae only). *H. S. Leeson*

HOLSTEIN, M. Etudes sur l'anophélisme en A.O.F. I. Soudan français, A.-Bamako. [**Studies of Anopheline Incidence in French West Africa. 1. French Sudan : A. Bamako.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 7/8, 374–8.

In October, 1948, the author collected the following anophelines at Bamako, French Sudan : *Anopheles coustani, A. coustani* var. *ziemanni, A. funestus, A. gambiae, A. rufipes, A. rufipes* var. *ingrami* and *A. pharoensis.*

Some notes are given on morphology, maxillary indices of *A. gambiae* and *A. funestus*, and on breeding places. *H. S. Leeson*

HOLSTEIN, M. Le problème d'Anophélès Gambiae. [**The Problem of** *Anopheles gambiae.*] *Bull. Méd. de l'Afrique Occidentale Française.* (*Journées Méd. de Bobo-Dioulasso 24 au 29 Jan. 1949.*) 1949, No. Spéc., 155–60, 2 figs.

The author believes that there are two forms of *Anopheles gambiae* occurring in French West Africa. One is large (referred to as *A. gambiae typicus*) the other is smaller (*A. gambiae minor*). The splitting of the species into these two forms is based on differences observed in their maxillary indices [though there is considerable overlapping in the figures given], and in their wing lengths. These differences are supported by others observed in the behaviour of the females and in the larval habitats.

A. gambiae minor is said to enter houses rarely before 8 p.m. but after this time it enters freely, feeds and leaves to rest outside, and by 7 or 8 o'clock next morning all have left. It breeds in " inorganic " water collections which are formed by rain, are temporary, often man-made and contain no vegetation, dead or alive, and no other anopheline larvae. [Are the smaller adults not due to insufficient larval food ?]

A. gambiae typicus, on the other hand, is reported to occur in numbers in houses in the daytime, and to feed, remain indoors to mature its eggs and then to leave for egg laying. The larvae of this form occur in "organic" water collections which are permanent or semi-permanent, and do not depend entirely on rain; they contain vegetation and the larvae of other anophelines are often present.

The author is confident that the two types of breeding places give rise to two forms of *A. gambiae* morphologically and biologically different. If then the fact is established, control workers will need to remember that house spraying alone will affect only *typicus* and anti-larval measures will continue to be necessary.

H. S. Leeson

TISSEUIL, J. Les gites larvaires des champs de cultures et leur importance au Soudan. [**Mosquito Breeding Places in Cultivated Areas and their Importance in French Sudan.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 44–5.

The author refers to the observation of HOLSTEIN [above] that the conditions found by the latter worker in Bamako during October were probably applicable to the rainy season as a whole.

Tisseuil suggests, as a result of his own observations between 1936 and 1938, that conditions in October (the end of the rainy season) are not completely valid for June and July, when the rains begin. It is then that cultivation starts and the constant digging results in the formation of small mounds of earth between which little ditches are created. These retain rainwater from one series of rain to another and are abundant breeding-places for anopheline larvae, especially those of *A. gambiae*. During October, the harvest is over and these breeding-places disappear, usually for long periods.

The author suggests that because of the importance of these breeding-places, a better system of cultivation would enable the Sudanese to carry out their work without obstructing the free flow of rainwater.

H. J. O'D. Burke-Gaffney

WANSON, M., PEEL, E. & LEBIED, B. L'infection expérimentale comparée d'*A. moucheti* Evans et d'*A. gambiae* Giles à *Plasmodium falciparum*. [**Comparative Experimental Infection of** *Anopheles moucheti* **and** *Anopheles gambiae* **with** *Plasmodium falciparum*.] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 405–16.

The authors, in Léopoldville, fed *Anopheles moucheti* and *A. gambiae* on volunteer carriers of plasmodial gametocytes and compared the resulting infections of the two mosquitoes. The parasite was *Plasmodium falciparum* and the rate of development was almost the same in both anophelines; sporozoites were observed in both in eleven days at 24°C.

From the sixth day after feeding the mosquitoes were dissected daily, the numbers of oöcysts were counted and measured and the sporozoites were measured on the first appearance. The maximum diameter for oöcysts was 60 μ and the maximum length of sporozoites was 17 μ. There were usually only one or two oöcysts, occasionally three or four but larger numbers were very uncommon.

The figures were derived from experiments with 20 reared and 46 wild-caught *A. moucheti* and from 536 bred *A. gambiae*. *A. moucheti* was difficult to rear in the laboratory and not easy to find in large numbers outside. Of the

reared *A. moucheti*, oöcysts were observed in four and sporozoites in two. Nine of the wild specimens were infected (giving a total rate of 19·5 per cent.) and showed a sporozoite rate of 13 per cent. In all, 390 *A. gambiae* were dissected and 85 were found infected (a total rate of 21 per cent.) and showed a sporozoite index of 6·9 per cent. ; the natural rates for *A. gambiae* at the same time of year were 24 per cent. total and 8 per cent. sporozoite.

H. S. Leeson

ROBINSON, G. G. **Medical Entomology : Third Annual Report, 1946.** *Northern Rhodesia. Health Dept. Ann. Rep. 1946.* Appendix II. pp. 59–64.

Thirty species of mosquitoes are recorded biting man near Livingstone, Northern Rhodesia. The most common species in order of abundance are *Taeniorhynchus uniformis, Anopheles coustani, Taeniorhynchus africanus, Anopheles squamosus, Anopheles funestus* and *Anopheles gambiae.*

Fourteen species of *Aëdes* breed in tree-holes in Livingstone, including the following vectors and potential vectors of yellow fever : *Aëdes aegypti, Aëdes simpsoni, Aëdes luteocephalus, Aëdes metallicus* and *Aëdes taylori.* Larvae of these were among those collected weekly during the wet season, December 1945 to May 1946, from bamboo pots hung in trees near the Zambezi river and near the European Hospital. Continued collecting from the bamboo pots showed that tree-hole species of *Aëdes* were able to survive and breed throughout the dry season.

An average of 45 huts were sprayed with pyrethrum during the last three days of each month from December 1945 to November 1946. A regular count of the mosquitoes knocked down indicated the seasonal fluctuation in the population of domestic Anophelines.

Anopheles gambiae reached its peak in February after the rainfall peak in January. Numbers declined in April coinciding with the cessation of the rain and the flooding of the Zambezi river. In July and August the temperature is at its lowest and *A. gambiae* is very rare. In September the rising temperature and the falling river-level are accompanied by the first showers and an increase in the *A. gambiae* population. *A. funestus* is at its peak at high water.

The malaria peak follows the *A. gambiae* peak. The *A. funestus* peak has little to do with the malaria of the Europeans because it rarely penetrates the built-up area though it may be responsible for some of their cold-weather malaria since *A. gambiae* is so rare at that time.

Control work follows the usual pattern ; some local problems are discussed. A small test of the effect of residual DDT showed that it remained effective for two months against both Anopheline and Culicine mosquitoes. Other insects were drastically reduced in number. Cockroaches (*Blatella germanica* and *Periplaneta americana*) in septic tanks were killed with 5 per cent. DDT in kerosene ; pyrethrum was useless for this purpose. *H. S. Leeson*

CHOW, C. Y. **Note on the Time of Feeding of** *Anopheles hyrcanus* **var.** *sinensis* **and** *Anopheles minimus* **in the Vicinity of Chungking.** *Chinese Med. J.* Shanghai. 1949, Sept., v. 67, No. 9, 489–90.

" Both *Anopheles hyrcanus* var. *sinensis* and *Anopheles minimus* fed chiefly before midnight on a buffalo in a stable ; but *sinensis* entered a tent set up nearby with human bait as frequently after midnight as before. The numbers of *minimus* caught in the tent were negligible. No *minimus* and few *sinensis* fed after 4 a.m."

DOWNS, W. G. & BORDAS, E. Hallazgo de *Anopheles aztecus* Hoffmann naturalmente infectado con Plasmodium, en la zona de Xochimilco, D.F. [**Natural Infection of** *Anopheles aztecus* **with Plasmodia in the Xochimilco Region, Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Dec., v. 10, No. 4, 321–5.

The English summary appended to the paper is as follows :—

" In dissections of *A. aztecus* Hoffmann from house captures in the Xochimilco-Mixquic region of the Valley of Mexico, one specimen was encountered with an oocyst infection of the gut and one specimen with an oocyst infection of the gut and sporozoites in the salivary glands. This finding, coupled with epidemiological observations, serves to implicate *A. aztecus* as the vector of malaria in the region."

DOWNS, W. G. **Morphological Notes on** *Anopheles aquasalis* **Curry and** *Anopheles oswaldoi* **Peryassu.** *Mosquito News.* 1950, Mar., v. 10, No. 1, 29–30, 6 figs.

" The occurrence of small spines on the terminal portion of the mesosome of some specimens of *Anopheles oswaldoi* from Trinidad, B.W.I., is described and illustrated."

DE BUSTAMANTE, F. M., COSTA, J. L. & AZAMBUJA, C. E. A. Sôbre malária no vale do Rio Uruguay, Estado do Rio Grande do Sul. [**Malaria in the Valley of the Uruguay River in the State of Southern Rio Grande.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4, 299–314, 1 folding fig. (map).

This is a brief account of a rapid malaria and anopheline survey of a number of towns along the river Uruguay in Southern Rio Grande State, Brazil. The investigation was conducted during the months January to May 1948 [?1947]. Though no cases of malaria were seen during this visit sporadic cases have occurred in the past. Five species of anophelines were taken, *Anopheles albitarsis, A. argyritarsis, A. noroestensis, A. strodei* and *A. triannulatus.* These species are regarded as unimportant as malaria vectors except perhaps for *A. albitarsis* which may have been responsible for the earlier cases. The climate is suitable for transmission but the anophelines seem to be more important at the present time as pests to be dealt with as a public health problem.

H. S. Leeson

BORGES, G. B. Distribuição geográfica do *A* (*N*) *darlingi* no Ceará. [**Geographical Distribution of** *Anopheles darlingi* **in Ceará, Brazil.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4, 282–7, 1 folding map.

The presence of *Anopheles* (*N*) *darlingi* has been confirmed in seven provinces in Western Brazil and is suspected in other districts of the western part of the state. There is little evidence of the penetration of *A.* (*N*) *darlingi* into Central or Eastern Brazil.

Areas around two towns in Western Brazil were examined in detail for *Anopheles* mosquitoes. The larval indices for *Anopheles* larvae were 4·93 per cent. and 5·27 per cent. respectively. The species found were :—

Species	Per cent. of total number of larvae collected	
	Town I (Camocim)	Town II (Crateus)
A. (*N*) *albitarsis*	70·05	85·49
A. (*N*) *tarsimaculatus*	14·84	—
A. (*N*) *argyritarsis*	12·85	11·47
A. (*N*) *darlingi*	1·39	1·52
A. (*N*) *pessoai*	0·52	0·43
A. (*Nyssorhynchus*) sp.	0·35	—
A. (*N*) *noroestensis*	—	1·09

In Camocim the average number of *Anopheles* mosquitoes caught per hour on human bait close to houses was 2·33. Three species were present in the following proportions :—

	Per cent. of total no. caught
A. (*N*) *albitarsis*	64·29
A. (*N*) *darlingi*	28·57
A. (*N*) *tarsimaculatus*	7·14

A. (*N*) *albitarsis*, which was the only species collected from human bait around houses in Crateus was captured at the rate of 2·27 mosquitoes per hour.

Animal baits attracted greater numbers of *Anopheles* : In Camocim an average of 20·83 and in Crateus 25·83 were captured per hour. *A.* (*N*) *darlingi* were captured at the rate of 2·67 and 1·00 per cent. per hour in the two towns respectively. *A.* (*N*) *albitarsis* formed 76·8 per cent. of the total number caught on animal baits in Camocim, and 80·99 per cent. in Crateus. *C. M. Harrison*

RACHOU, R. G., RICCIARDI, I., LUZ, E. & JUNIOR, J. G. Observações, no Estado do Paraná, sôbre o pouso dos anofelinos, vetores de malária no interior das casas. [**Study of the Resting Places of Anopheline Vectors of Malaria inside Houses in Paraná, Brazil.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4, 288–98.

In order to make the best use of DDT house-spraying to check malaria, a study was made of the house-haunting habits of important vector mosquitoes in the state of Paraná. Three species are particularly important *A.* (*Kerteszia*) *cruzii*, *A.* (*K.*) *bellator* and *A. darlingi*. Of these, the first two are vectors of hyperendemic malaria along the coast ; whereas *A. darlingi* causes occasional severe epidemics inland. The results of observations were as follows :—

Sub-genus Kerteszia

At Guaratuba, 142 inspections were made in 12 houses, 132 being positive and revealing 3,187 anophelines of the sub-genus *Kerteszia* (2,053 *cruzii* and 926 *bellator*).

The catches were divided into specimens caught in rooms used for sleeping and other rooms, thus :—

cruzii { 57·52 per cent. in sleeping rooms.
42·48 per cent. in other rooms.

bellator { 55·40 per cent. in sleeping rooms.
44·60 per cent. in other rooms.

Examinations showed that 71·80 per cent. of *cruzii* and 75·16 per cent. of *bellator* were engorged. Of the mosquitoes actually found in the sleeping rooms, 74·09 per cent. of *cruzii* and 75·63 per cent. of *bellator* were engorged; corresponding figures for the other rooms were 68·69 and 74·58.

The numbers of mosquitoes resting on different parts of house interiors were as follows :—

	A. (*K*) *cruzii*	*A.* (*K.*) *bellator*
	Per cent.	Per cent.
Ceilings	68·39	70·19
Walls	27·96	25·70
Furniture, curtains, etc.	3·65	4·10

The numbers resting on the walls were analysed according to the height from the floor. (A correction had to be made because very few houses had rooms tall enough for the highest category.) The mean numbers were :—

	cruzii	*bellator*
0–1 m.	8·33	4·42
1–2 m.	22·17	7·42
2–3 m.	25·21	11·69
3–4 m.	0·62	—

This suggests a general preference for the higher part of the walls.

A. darlingi

Inspections were made in three houses at Marques dos Reis. In 112 visits, 2,101 examples of *A. darlingi* were found. The proportions found in sleeping rooms and other rooms were 82·53 and 17·47 per cent. respectively. Of the total number, only 30·79 per cent. were engorged. The distribution of the *darlingi* was as follows :—

Ceilings	0·05 per cent.
Walls	98·62 ,, ,,
Furniture, curtains, etc.	1·33 ,, ,,

Of those resting on the walls, the total numbers were

0–1 m. ...	954
1–2 m. ...	1,018
2–3 m. ...	109
3–4 m. ...	0

There is clearly a preference for the middle part of the wall.

As a result of this survey it is suggested that spraying against *Kerteszia* should include all rooms and the treatment of ceilings and upper parts of walls.

Treatments against *A. darlingi* should give especial attention to bedrooms and their walls only, especially the middle zone. *J. R. Busvine*

RACHOU, R. G. & AZAMBUJA, C. E. A. Da atividade diurna de anofelinos do sub-gênero *Kerteszia*. [**The Daily Activity of Anophelines of the Sub-Genus** *Kerteszia*.] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1949, Oct., v. 1, No. 4, 315–25, 1 chart. [10 refs.]

Mosquitoes of the sub-genus *Kerteszia* are malaria vectors in Trinidad and on certain regions of the coast of Brazil; four Brazilian centres are specifically mentioned. The activity of these mosquitoes has been studied in relation to entering houses and biting man. RACHOU [this *Bulletin*, 1947, v. 44, 165] made a series of observations of the numbers of *Kerteszia* entering houses at different hours of the day and night. The following average figures were found for different hours of the diurnal cycle, which are given in brackets: (1) 19·9, (2) 22·3, (3) 26·7, (4) 37·2, (5) 41·0, (6) 66·9, (7) 49·7, (8) 28·0, (9) 17·1, (10) 12·4, (11) 8·6, (12 noon) 6·1, (13) 5·4, (14) 3·6, (15) 5·1, (16) 3·5, (17) 5·3, (18) 12·6, (19) 48·9, (20) 31·9, (21) 21·7, (22) 25·4, (23) 31·8, (24) 28·1.

It will be noted that mosquitoes enter at all times, though more frequently at night; there are two peaks, one at 6 a.m. and one at 7 p.m.

The authors give a series of records of *Kerteszia* mosquitoes coming to bite men out of doors either walking or in human bait traps. From these records they affirm that these mosquitoes (mainly *A.* (*K.*) *cruzii*) will bite both by night and day. Though they are most active round the margins of forests, they will bite in open clearings as well as in the shade. *J. R. Busvine*

MAYER, M. & PIFANO C., F. Conservación por años en la nevera de cerebros con *Plasmodium falciparum*. [**Prolonged Preservation in Ice of Brain Tissue containing** *Plasmodium falciparum*.] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 327–8.

The English summary appended to the paper is as follows:—

"Parts from brain, especially those from cortex cerebri, from two cases of malaria comatosa, namely one of 1940 and the second of 1941 have been kept in the electric ice-box at minus 3° approximately.

"The capillaries full with pigment have been well preserved up to this day (1949). Unstained smears show between the slides and slide-covers the same arrangement of the pigment as this is seen in smears prepared from fresh material. On stained smears one recognizes also the endothelial cells which are fairly conserved.

"In some places of the thinner parts of the smears besides the pigment one sees division forms with well stained nuclei of merozoites.

"This experiment is of great value for practical courses because it allows to do diagnosis exactly as by using fresh material from autopsies, especially by unstained smears."

ZACHARIAS, F. J. **The Diagnostic Value of Bone-Marrow Biopsy in Malaria caused by** *Plasmodium falciparum*. *Ann. Trop. Med. & Parasit.* 1949, Dec., v. 43, Nos. 3/4, 297–303. [23 refs.]

Two groups of cases were examined at Takoradi, Gold Coast, to ascertain the relative value of smears of peripheral blood and sternal marrow in the diagnosis of *P. falciparum* malaria. One group consisted of 41 patients who had had three days' fever not obviously complicated by other diseases and who had positive blood films. Thick films of blood and marrow were prepared simultaneously and were stained by Field's method. In 31 cases parasites were more numerous in the blood, in nine they were fewer and in one they were equal in number.

Usually the difference was only slight. The second group consisted of 59 patients with "clinical" malaria, *i.e.*, typical symptoms of the disease with persistent pyrexia, tenderness in the left hypochondrium, but with five negative blood films each. Films from the peripheral blood and from the bone marrow were examined for 30 minutes before being recorded as negative. Two cases were found positive on the sixth occasion in the peripheral blood, and 14 showed scanty parasites (ring forms only) in the marrow. The positive cases were more numerous among patients who had suffered from previous attacks of malaria or who had been on inadequate suppressive therapy.

[The author concludes from these results that sternal puncture is not a justifiable procedure in the diagnosis of acute malignant tertian malaria from a "military standpoint". From the ordinary standpoint, however, a method which clinches the diagnosis in 21 per cent. of cases is surely of value.]

P. C. C. Garnham

TALBOT, D. R., ELERDING, A. C. & WESTWATER, J. O. **Epilepsy as a Sequela of Recurrent Malaria.** *J. Amer. Med. Ass.* 1949, Dec. 17, v. 141, No. 16, 1130–32, 3 figs.

The authors describe three cases in which the patients, all war veterans, had convulsive seizures and abnormal electroencephalograms characteristic of epilepsy. All had suffered from chronic relapsing malaria which had been acquired in the South Pacific in two cases and in North Africa in the other. In all cases there was suggestive evidence that malaria was responsible for the cerebral damage. Noteworthy improvement followed intensive malaria therapy in all three cases, but in one, at least, permanent cerebral damage seems to have been done. In such cases treatment of the malaria is of primary importance. Until this has been done anticonvulsive drugs are of only secondary value.

Reference is made to an unpublished paper by TALBOT presented to the Western Association of Electro-Encephalography, San Francisco, 1948, describing 40 cases of recurring malaria in which the patients presented some residual abnormality of the central nervous system. A third of these patients showed electroencephalographic and clinical evidence of some form of epilepsy. Seizures often disappeared after the malaria had been treated, and without the use of anticonvulsive drugs. [In the absence of the details contained in the senior author's unpublished paper, it would be difficult to decide conclusively that the conditions described were attributable primarily to malaria, or to what extent "the usual nonspecific generalized abnormality noted in chronic malarial encephalopathy" had in fact been established.

Norman White

PLOYÉ, M. Du choix d'un antimalarique. [**Choice of an Antimalarial Drug.**] *Méd. Trop.* Marseilles. 1949, July–Aug., v. 9, No. 4, 561–78. [41 refs.]

The author passes in review the most widely used synthetic antimalarial drugs and with selected extracts from the literature details the merits and demerits of each. The paper starts with the conviction and ends with the conclusion that quinine is still the most valuable antimalarial drug that we possess. It is only in the case of relapsing malaria that the association of quinine with a drug of the plasmoquine class is indicated.

The French quinine industry is now in a position to satisfy all demands made on it by France and French possessions, with a surplus for export.

Norman White

KENNY, M. **Relationship of Inadequate Treatment to the Formation of Gametocytes of *P. falciparum*.** *Brit. Guiana Med. Ann. 1947.* 33–6.

In a mining area on the Berbice River, British Guiana, blood examinations of the whole population were made twice a month. Before any treatment was started, 29 gametocyte carriers were found among 874 persons infected with *P. falciparum*, 3·3 per cent. Subsequently all those harbouring *P. falciparum* were given a short suppressive course of mepacrine, 15 tablets of 0·1 gm. All these were not necessarily taken. Among 80 patients who had received this insufficient treatment 14, or 17·5 per cent., developed gametocytes in less than two weeks. Later, when mosquitoes had been controlled, full courses of mepacrine, 24 tablets of 0·1 gm. each, were given to all infected with *P. falciparum*. Among 317 patients who had received this full course only two, 0·06 per cent., developed gametocytes. *Norman White*

KAPUR, K. B. & DAS GUPTA, P. R. **Sexual Disorder in " Mepacrine Psychoses ".** *Indian Med. Gaz.* 1950, Jan., v. 85, No. 1, 20–22.

" 1. Two cases of temporary mental disorder following mepacrine administration in patients suffering from giardia infestation are described.

" 2. There seem to be no premonitory symptoms or indications which would enable the physician to anticipate the advent of mental symptoms in any particular patient under treatment with mepacrine. It is significant, however, that both of the cases were of ' highly strung and nervous nature '.

" 3. Intense sexual excitement was a marked feature in both the cases, cause of which needs further investigation.

" 4. The part played by Crude Liver Extract or Vitamin B Complex or both is difficult to assess. A bigger series of such patients must be investigated before a definite opinion can be given. (Case ' A ' was treated without and Case ' B ' treated with Liver Extract and Vitamin B Complex, but the rate of recovery was practically the same and the ultimate outcome was also similar.)

" 5. Both the patients recollected to a fair extent their unusual behaviours during their illness. This is in contrast to what some other workers have reported with regard to mental psychoses following mepacrine administration for the treatment of malaria."

HOEKENGA, M. T. **Camoquin Treatment of Malaria : a Preliminary Report.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 63–9, 4 figs. [13 refs.]

This study is based on the treatment of 50 patients living on the Isthmus of Panama, aged from 1 to 78 years. Thirty-four of these patients were mestizo, *P. vivax* and *P. falciparum* infections being equally prevalent. The remaining 16 patients were white, 15 with *P. vivax*, 1 with *P. falciparum* infections. Camoquin was given in a standard single dose of 10 mgm. per kgm. of body weight. Rectal temperatures were recorded every two to four hours until they were normal. Blood films were examined twice daily.

Disappearance of fever occurred quickly. In all patients temperatures were normal within 48 hours of treatment, generally within 32 hours. Parasites disappeared from the blood at average intervals from treatment of 37 hours for *P. vivax* and 30 hours for *P. falciparum*. Only one *P. vivax* clinical relapse was noted ; the patients were under observation from 6 to 16 months. Four patients complained of nausea after taking camoquin, but it appeared to be a relatively non-toxic drug. The author considers camoquin to merit more widespread use. It should be of great value in rural areas or wherever hospitalization of patients is not feasible. *Norman White*

CIUCA, M., BALLIF, L. & CHELARESCU, M., with the co-operation of A. TIMISESCU, F. VASILIU-MUNTEANU & M. VRABIE TROFIM. **Paludrine Treatment of Experimental Malaria Infection ; Effective Minimum Doses.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Jan., v. 43, No. 4, 435–8.

Twelve patients requiring malariotherapy were infected with a Madagascar strain of *P. vivax* by the inoculation of infected blood, intramuscularly or intravenously. Paludrine [proguanil] treatment was administered from the 6th to 11th day of fever onward. The duration of treatment varied from 7 days (ten patients) to 15 days. The daily dose of paludrine was 100 mgm. (one patient) ; 200 mgm. (nine patients) ; 300 mgm. (two patients).

In ten patients fever disappeared 24 hours after administration of the first dose : two patients had no fever after the second dose. The average interval between the administration of the first dose and the disappearance of parasites from thick drops was 6·4 days. The varying paludrine doses showed similar therapeutic efficacy.

Twelve patients were infected with *P. falciparum*, five with infected blood, seven with sporozoites. They were treated with daily doses of 100 mgm. to 300 mgm. of paludrine for periods of from five to ten days. The blood-infected patients treated for seven days with either 100 or 200 mgm. a day lost their fever and parasites in 1·6 and 4·8 days (averages), respectively : all five patients harboured gametocytes for long periods. The seven patients infected with sporozoites lost their fever and parasites at average intervals of 1·5 and 6·4 days respectively. All were gametocyte carriers.

Daily doses varying from 100 to 300 mgm. of paludrine, and treatments lasting from five to ten days were alike effective. *Norman White*

BINCER, W. **Vivax Malaria Relapse Rate and Proguanil Treatment.** *Bull. Inst. Marine & Trop. Med., Med. Acad., Gdańsk, Poland.* 1949, v. 2, Nos. 3/4, 247–8.

The author refers to 50 patients with *P. vivax* malaria in Danzig who were treated for seven to ten days with 300 mgm. of proguanil daily. After a year of follow-up, a relapse rate of 4·5 per cent. was noted : in previous years, when mepacrine and plasmoquine treatment was used, the author had found a relapse rate of about 15 per cent. With mepacrine alone, it was 25 per cent. Later, in another series, he compared the results of treatment with proguanil and plasmoquine with those when proguanil and aralen [chloroquine] were used. In each case, 300 mgm. of proguanil daily in three equal doses were given for seven days. In the first group this was followed by 60 mgm. of plasmoquine naphthoate daily in three equal doses for three days : in the second, in place of plasmoquine, the course of proguanil was followed by 750 mgm. of aralen daily in three equal doses for three days.

Sufficient numbers have not yet been studied to justify any conclusions regarding the anti-relapse value of these combined treatments in *vivax* malaria acquired in Poland : but the author adds that so far, after three months, no relapses have been recorded.

He stresses two points ; firstly, the complete absence of any side-effects in the combined treatments, and secondly the fact that a saving of two hospital days is achieved. When mepacrine and plasmoquine were used, the author was accustomed to allowing such an interval between the administration of the two drugs because of possible toxic effects : no such interval is required between the proguanil course and the administration of plasmoquine or aralen.

The author considers that the innocuity of a combination of proguanil with either aralen or plasmoquine should allow the two drugs in that combination to be used simultaneously, thus saving another two or three hospital days; he contemplates so using them in a new series. He adds that a compound having, for example, proguanil and aralen in one tablet would simplify the treatment considerably.

H. J. O'D. Burke-Gaffney.

COLLARI, S. L'Agro Pontino e la bonifica antimalarica. [**The Pontine Country and its Reclamation from Malaria.**] *Riv. di Malariologia.* 1949, Oct., v. 28, No. 5, 299–322, 4 figs. English summary (3 lines).

This paper is much more than a recital of the well-known story of the conquest of malaria in the formerly hyperendemic Pontine marshes. It gives a very interesting historical account of the *Agro Pontino* from the time of the foundation of Rome in the eighth century B.C. at which time it appears to have been very healthy and prosperous, famed for its fruit production, to the present time. The story of the decline of that early civilization, of the centuries during which the *Agro* remained derelict, devastated by malaria, of the remarkable attempts at reclamation that were made spasmodically through the middle ages, and of the final triumphant bonification is very well told.

Norman White

LIVADAS, G. A., KOROVANNAKI, F. K. & ISSARIS, P. C. **Malaria Control in Greece during the Four Year Period 1946–49.** *Riv. di Malariologia.* 1949, Oct., v. 28, No. 5, 247–90, 5 figs. [30 refs.]

This is an account of the malaria control work carried out in Greece during the four years 1946–49; sole reliance was placed on DDT throughout. No important drainage schemes were carried out during this period and there was no distribution of prophylactic drugs. DDT spraying of houses and outbuildings was done in all villages in endemic areas: a 25 per cent. emulsion, diluted locally with water to form a 5 per cent. emulsion, was generally used for this purpose. DDT was used as a larvicide near towns when breeding places were limited in extent. DDT airspray was carried out over lakes, rivers and large swampy areas which were otherwise inaccessible. The total amount of DDT used in 1948 was 364 tons.

In 1949 spraying of houses was carried out in 5,410 villages and towns: 689,124 houses containing 3,981,417 persons were thus treated. The average cost per protected person was $0·31.

The decline in malaria incidence as the result of this nation-wide campaign is best indicated by the fall in the autumn parasite index of school children. The average index for 1933–45 was 17·23 per cent. (169 areas): in 1946 it was 1·74; 1947, 0·23; 1948, 0·15 per cent. (190 areas).

In the Greek army there were 477 cases of acute malaria between August and December 1945: in 1946 there were 45 cases throughout the year; 1947, six cases; 1948, eight cases. The strength of the army was increased progressively during the period.

The average annual consumption of quinine before the war was 30,000 kgm.; in 1948 it was 2,320 kgm. The cost involved in carrying out the control programme is approximately equal to the amount saved on the purchase of antimalarial drugs.

Norman White

OKAN, S. Türkiyede sitma savasi. [**Malaria Control in Turkey.**] *Türk Ijiyen ve Tecrübi Biyoloji Dergisi.* Ankara. 1949. v. 9. No. 3. 102–15. 4 graphs & 2 folding maps. English version 116–31, 8 figs.

Malaria has long been endemic in Turkey and local epidemics occurred from time to time. After the first world war, returning Turkish troops brought fresh strains of malaria with the result that malaria, notably *P. falciparum* infections, became much more widespread. In 1925 a programme of malaria control was embarked on. A number of malaria control areas were designated. In 1944 these numbered 18 independent areas and one secondary one, comprising in all 4,614 villages with a population of 3,650,068. The staff employed on malaria control work included 151 medical officers and 563 subordinate workers. The results were good but disorganization arising from the second world war caused a further spread of *P. falciparum* malaria and severe epidemics have occurred in parts of Turkey where the population had no premunition against the disease. In 1946 an independent General Direction of Malaria Control was set up. At present malaria control measures are operative in three-quarters of Turkish territory, affecting a population of 9,616,676. There are 41 malaria control areas. The number of malaria patients treated in 1945 was 2,542,272. In 1948 the number fell to 1,672,021. This last figure represents 26 per cent. of the total population of Turkey. The spleen index fell from 25 per cent. in 1946 to 14 per cent. in 1948. Deaths from malaria have shown a welcome decline: there were 686 deaths from malaria among 11,091 patients in hospitals in 1943; 91 among 4,094 in 1948. The six ambulatory malaria hospitals that are always ready to deal with an epidemic have for the past two years been practically empty.

The improved malaria situation is reflected in the vital statistics. The crude death rates for 1943 and 1944 were 19·68 and 18·96 per mille respectively. In 1947 and 1948 they were 11·14 and 11·44 per mille. The birth rate in 1948 was 29·93 per mille. The infant mortality rate in 1948 was 77·54 per thousand live births.

DDT is being used as a house spray and as a larvicide and is now being manufactured in Turkey. Usually three sprayings a year are made.

For treatment and as a suppressive atebrin [mepacrine] has been widely used.

Norman White

GAUD, J., MÉCHALI, D. & CLIER, J. L. Emploi et avenir des insecticides de contact au Maroc dans la prophylaxie des maladies épidémiques. [**The Use and Prospects of Contact Insecticides in the Prevention of Epidemic Diseases in Morocco.**] *Bull. Inst. Hyg. Maroc.* 1948. v. 8. 35–90. 6 figs. & 7 pls. [31 refs.]

This paper gives an account of the results hitherto achieved in Morocco by the use of contact insecticides and considers the contribution they may make in the future to the solution of the epidemiological problems of that country. Attention is confined to DDT and HCH [benzene hexachloride, BHC].

As mosquito larvicides in the control of malaria, DDT in solution, DDT powder and HCH all had a much more prolonged effect than the older larvicides, twice as long as mazout, four times as long as paris green. Their toxicity for cattle was much lower than that of arsenical preparations, and they had not the deleterious effect on vegetation that oily preparations exercise. This latter point is important with regard to water used for irrigation. But the cost of these new preparations is relatively high—two and a half times the price of mazout, and seven or eight times the price of paris green for a single

operation. The experiments made do not permit of an assessment of the relative value of DDT in solution, DDT powder and HCH respectively, as larvicides.

Experimental house-spraying with DDT has been carried out during three recent years in Morocco to determine the duration of action of DDT in local conditions. The experiments were made in three different parts of the country. The results have been relatively disappointing. *Anopheles* reappeared 15 days after spraying with DDT dissolved in kerosene, even in quantity as high as 2 gm. per square metre ; 25 days after spraying with DDT suspended in water, 1·0 gm. to the square metre. The permeability of the walls probably explains the superiority of suspensions. Possible explanations of the short-lived toxicity in Morocco are : high temperatures during summer, perhaps resulting in the transformation of DDT into inactive isomers : smoke black and dust may cover the film of DDT in houses in Morocco more rapidly than in other countries : the structure of Moroccan houses ; it is difficult to make the insecticide penetrate into all the cracks and crevices of the walls. It would seem that in Morocco DDT house-spraying is unlikely ever to obviate the necessity for antilarval measures, but in certain cases it may be substituted for prophylactic medication.

DDT has been used with marked success in controlling louse-borne infections, relapsing fever and typhus. Interesting details are given of the methods employed in mass delousing.

Contact insecticides are highly valued by the people of Morocco. The delousing operations with DDT or HCH rid them of their fleas as well as of their lice ; they are less tolerant of fleas than of lice. *Norman White*

BERNET. Exposé sur la lutte antipalustre en A.O.F. Objet et fonctionnement du Service. [**The Antimalaria Campaign in French West Africa : Aims and Functions of the Service.**] *Bull. Méd. de l'Afrique Occidentale Française.* (*Journées Méd. de Bobo-Dioulasso 24 au 29 Jan. 1949.*) 1949, No. Spéc., 127–33.

In 1948 a Malaria Section of the Mobile Health and Prophylaxis Service of French West Africa was created. Its aim is the control of malaria in the large centres and certain other important communities. A territory-wide control is too vast to be envisaged at the present time. Its headquarters are at Bobo-Dioulasso and it is controlled by a medical officer working in conjunction with an entomologist. Its first preoccupation is an anopheline survey of the area.

During 1948 work was started at places in the Soudan, Ivory Coast, Dahomey and Upper Volta. A brief description of work accomplished in these areas is given. In 1949, 14 malaria teams were provided for, each consisting of a European supervisor, a trained African technical supervisor and 20 labourers. In addition large antimalarial works involving an expenditure of 13 million francs were to have been put in hand. Much is expected of the enterprise.

Norman White

BERNET. La lutte antianophélienne. Quelques points particuliers. [**Anti-anopheline Campaign : Some Points of Importance.**] *Bull. Méd. de l'Afrique Occidentale Française.* (*Journées Méd. de Bobo-Dioulasso 24 au 29 Jan. 1949.*) 1949, No. Spéc., 135–49.

In French West Africa *Anopheles gambiae* is the most redoubtable vector of malaria. *A. funestus* comes second, and then *A. pharoensis*, *A. coustani*, *A. obscurus* and *A. rufipes*. In the large centres only the first two species call for attention. There appear to be two varieties of *A. gambiae*, one using

dwelling houses as daylight resting places, the other rapidly leaving the dwelling after feeding [see HOLSTEIN above]. In the first case DDT residual spray should be effective. It is unlikely, however, that spraying will give such spectacular results as those reported from Greece and Italy, for example. For the propagation of *A. gambiae* man-made breeding places are as important as, or more important than, natural breeding places. In French West Africa collections of water invaded by the plant *Pistia stratiotes* are prolific breeding places of mosquitoes, including anophelines.

The author describes at considerable length methods for the abolition of anopheline breeding places, draining, filling, etc., that have been found most useful in French West Africa and stresses the importance of attention to details, the neglect of which may well create new hazards.

Norman White

DAVIDSON, G. **A Field Study on "Gammexane" and Malaria Control in the Belgian Congo. I. The Anophelines of Yaligimba and their Bionomics.** *Ann. Trop. Med. & Parasit.* 1949, Dec., v. 43, Nos. 3/4, 361–72, 1 map & 6 figs. on pl. [10 refs.]

The object of this field study was to determine the effect of "Gammexane" (the Imperial Chemical Industries' proprietary name for their benzene hexachloride products) on the incidence of malaria in a more or less isolated community in Central Africa; "Gammexane" applied by the residual insecticide method was the sole measure of mosquito control used during the period September 1947 to March 1949. [See this *Bulletin*, 1949, v. 46, 329.]

An oil palm plantation at Yaligimba (2° N. 23° E.) in the forest country of the Congo basin, was selected for this purpose; some 30 square miles of forest had been cleared and planted with the oil palm (*Elaeis guineensis*); the wide, navigable river Itimbiri, a branch of the Congo, lies some three to four miles from the plantation's south-east corner; to the west and east lie small tributaries of the Itimbiri. The plantation area is well drained. Seasons of heavy rain occur in April and October, but in the period of observation the annual rainfall was below normal at 1,454·5 mm. (57·3 inches) and 1,284·5 mm. (50·6 inches) respectively. The adjoining river Itimbiri is at its lowest level in February and highest in November.

Around the perimeter of the plantation are situated ten camps in which 6,000 persons live, including the estate workers. African villages line the 12- and 8-mile lengths of road which run within two miles of, and parallel to, the southern and eastern boundaries; these roads join within three miles of the south-east corner.

Breeding places of anophelines

A. moucheti is a strictly fluvial species in its choice of breeding places in the shade of tall grasses at the edges of rivers, in water which, though apparently still, is in fact being slowly and constantly renewed. Despite the large numbers of adult *A. moucheti*, very few larvae could be found in the rivers and none in the extensive swamps within flight range. Perhaps the breeding places are associated with particular species of marginal aquatic plants, which occur only at intervals along river banks.

A. gambiae was found in small open man-made pools in the roads in the plantation and district. Its seasonal variation in density appears to be associated with the period when rain extends over the greatest number of days, *i.e.*, July to November, rather than with the period of heaviest rainfall in April.

A. paludis was found breeding in the permanent swamps and the grassy edges of streams, without any evidence of seasonal variation.

The adult mosquito

The methods of catching mosquitoes are described : (*a*) mosquitoes resting in houses by day were knocked down to white floor sheets by a pyrethrin spray (" Flit ") ; (*b*) defective African mosquito nets acted as traps ; (*c*) specially designed bed-net traps ; (*d*) two types of window traps fixed to the exterior of the only window of sleeping rooms, which were otherwise light-tight. (Photographs are included.)

Of the three species of mosquito found in the area, *A. paludis*, *A. gambiae* and *A. moucheti*, the last-named was by far the most common, the numbers were 124 (no males), 931 (109 males) and 33,311 (one male) respectively. The absence of male *A. moucheti* inside houses may indicate a distant breeding site or a disinclination for the male of this species to leave the immediate vicinity of that site ; the single male caught was in a window-trap.

TABLE I

Analysis of mosquito species caught by different methods in Yaligimba and district from September, 1947, to March, 1949

Method of Catching	Female anophelines			Male Anophelines	Culicines	
	A. moucheti	*A. gambiae*	*A. paludis*		Female	Male
" Flit " ...	12,165	608	9	107g.	1,483	74
Window-traps	9,543	62	72	2g. 1m.	1,240	2
Net-traps ...	10,139	131	38	0	3,232	1
Native nets ...	1,463	21	5	0	469	0
Total ...	33,310	822	124	109g. 1m.	6,424	77

g.=*A. gambiae*. m.=*A. moucheti*.

Two further tables (including Table IV below) of catches by the various methods in untreated houses indicate that many more *A. moucheti* enter and leave a single house in one day than rest in it, and the " Flit "-catching method alone, therefore, does not give a true picture of the mosquito population of any one house.

TABLE IV

Comparison of catches of A. moucheti *made by the " Flit "-catching method, window-traps and net-traps over the same periods in untreated villages*

Village and date	" Flit "-catches		Window-traps		Net-traps	
	No. of houses examined	Average catch per house	No. of trap-days	Average daily catch	No. of trap-days	Average daily catch
Madosso, 18.2.48 to 6.3.48 ...	9	26·1	15	91·3	8	26·25
Bokombe, 14.4.48 to 1.5.48 ...	5	15·0	16	138·4	20	79·7
Mandika, 24.8.48 to 20.11.48	24	28·0	49	47·5	45	45·2

Window-trap observations made at dusk and dawn on the same houses in two different villages show that the main exodus of *A. moucheti* takes place during the night and in the early morning.

A study of stomach and ovary conditions among mosquitoes caught by the different methods indicated that *A. moucheti* rested in houses for some time after feeding, but never for sufficient time for the complete maturation of the ovaries to occur, which in *A. moucheti* takes much longer than in *A. gambiae*. An analysis of this study is tabulated.

From these observations on the house-haunting habits of *A. moucheti* it seems reasonable to suppose that most of the females feed in the evening or at night and, after feeding, rest in the houses at least till the following morning. Some, however, may remain in the houses all day, to leave on the following evening or perhaps in the morning after. No outdoor resting places of *A. moucheti* were found.

The comparative scarcity of *A. gambiae* and *A. paludis* in the area did not permit observations on their house-haunting habits to be made in the same detail as for *A. moucheti*.

The highest densities of *A. moucheti* were found in those camps and villages which were nearest to the river Itimbiri and its tributary on the west side of the plantation. Camps and villages more remote from these two breeding areas showed very few *A. moucheti*. *A. gambiae* was localized in its distribution and commoner within the plantation than outside, with the exception of two villages adjacent to a man-made breeding place. Most *A. paludis* adults were found on the west side of the plantation adjacent to swamp breeding places.

Sporozoite rates were as follows: *A. moucheti* 0·38 per cent. in 3,927, *A. gambiae* 3·8 per cent. in 651 and *A. paludis* nil in 63 examined. Sporozoite rates for *A. moucheti* at other places on the Congo River vary from 0·072 to 6·30 per cent. [A second part of this paper is to follow.] *R. Ford Tredre*

BUSVINE, J. R. **Effects of Malariol Films on the Oviposition of Captive** *Anopheles vagus*. *Med. J. Malaya.* 1949, Dec., v. 4, No. 2, 106–10.

Tests were made with wild caught *Anopheles vagus* to discover if a film of "malariol" 1 μ or 0·1 μ thick on water in Petri dishes would deter females from laying eggs.

In cages $9 \times 9 \times 9$ inches in size there was little evidence of repellency, owing perhaps to the nearness of the treated and untreated dishes in such small cages. In cages $1\frac{1}{2} \times 2 \times 1\frac{1}{2}$ feet in size there was some repellent effect. In a hut the mosquitoes seemed to be attracted to water in dishes surrounded by "moats" of "malariol". It was thought the colour of the malariol might account for this [though the eggs were laid at night] so the test was repeated with some dishes placed over paper of the colour of the malariol. There was no evidence of attraction by colour.

A statistical analysis of all the data indicated that the number of eggs on the clean water dishes tended to be greater than those on oiled dishes, and as numerous eggs were laid on the water surrounded by malariol, the repellence was not due to oil vapour.

In these tests the numbers of eggs per female per night were considerably below previously published figures; therefore, the captured mosquitoes were grouped according to the state of the ovaries and the blood meal before the next test which lasted four days. Only the groups having well-developed ovaries and containing a recent blood meal produced normal egg batches.

H. S. Leeson

MACREADY, S. D. **Three Years' Observations in the Use of DDT Residual Spray for Control of** *Anopheles albimanus* **in Tropical Labor Camps.** *Proc. & Papers 17th Ann. Conf. California Mosquito Control Ass., Feb. 7–9, 1949.* 5–7.

PENIDO, H. M., PINTO, D. B. & DE SOUZA, E. F. Considerações sôbre o emprêgo do DDT como antialado e anti--larvário no combate à malária. [**Notes on the Use of DDT against Adult Mosquitoes and Larvae in Malaria Control.**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1948, Dec., v. 2, No. 2, 561–8, 1 map.

"The authors submit results of the experiments undertaken in the Rio Doce basin to observe the effect of indoor spraying with DDT on the density of *A. darlingi* larvae, and the duration of the effect of a DDT emulsion applied in different types of water collections. The following conclusions were reached :

"1) Indoor spraying with DDT in the proportion of 2 grams per square meter, carried out two or three times a year, was not sufficient to eradicate *A. darlingi* larvae in an experimental area of 140 square meters, where the density of houses was 3·6 per square kilometer and where the number of *A. darlingi* breeding places amounted to 0·5 per square kilometer.

"2) The treatment of water collections with a DDT emulsion at 5 p.p.m. makes it possible to establish a cycle of larva control work of approximately 30 days."

RACHOU, R. G., DE BUSTAMANTE, F. M. & FERREIRA, M. O. Da aplicação extradomiciliar de DDT, por helicóptero, como meio de combate aos anofelinos do sub-gênero *Kerteszia* em região com predominância de bromélias terrestres. [**The Application of DDT by Helicopter to control *Kerteszia* Mosquitoes in Bromeliad Areas.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1949, Oct., v. 1, No. 4, 264–81, 1 folding map.

This paper records further experiments in spraying by helicopter to kill anophelines of the sub-genus *Kerteszia* which breeds in the axils of bromelias. [See DE BUSTAMANTE *et al.*, and FERREIRA *et al.*, this *Bulletin*, 1949, v. 46, 1120.] The work was also done in the State of St. Caterina, in an area along the coast, of about 1 million sq. metres. As before, entomological assessment was made before and after the treatment. The following methods were used : larval density per bromelia, counts of adult mosquitoes in houses, counts of mosquitoes in Shannon (animal-baited) traps and Caldas (human-baited) traps. The pre-treatment surveys were done in two periods : 6/1/48 to 20/3/48 and 7/4/38 to 16/4/48. Post-treatment survey was from 23/4/48 to 31/5/48. Unfortunately the treatment was done at a time of declining anopheline density so that part of the reduction might be ascribed to natural causes. To check this, observations were made on an untreated neighbouring locality at the time of the post-treatment survey.

Treatment.—Aqueous suspension of 5 per cent. of a 50 per cent. wettable DDT powder was made by helicopter at the rate of 546 gm. DDT per hectare (about 7 oz./acre). This was applied in 2–3 hours' flying on 22/4/48. Some of the results are given in the following table :—

	Before treatment		After treatment	Control locality
	Jan.–March	April	April–May	April–May
Larvae per bromelia	2·65	—	0·62	—
Larvae per positive bromelia	7·87	—	5·18	—
House index (per cent. infested)	32	24	4·2	—
House density	5·68	0·99	0·06	2·04
Traps :				
Average per animal trap	28·2	1·62	0·65	—
Average per hour : human trap	14·3	11	0·57	30·8

A seasonal decline in numbers can be seen in the two pre-treatment periods [but not in the control locality human-bait trap results !] There is evidence of a real reduction due to treatment, however.

An additional check was conducted by artificially infesting 30 bromelias with ten larvae each. After treatment, 147 live and 11 dead (6·9 per cent.) were found. This suggests that the spray is not very effective as a larvicide and that its effects are mainly due to killing adult *Kerteszia*.

J. R. Busvine

RODHAIN, M. J. Le paradoxe du " Plasmodium vivax ", chez le chimpanzé. [**The Paradox of *Plasmodium vivax* in the Chimpanzee.**] Reprinted from *Bull. Acad. Roy. Méd. Belgique.* 1949, v. 14, No. 1, 17–22.

Rodhain has made further experiments in the attempt to transmit *Plasmodium vivax* to the chimpanzee [this *Bulletin*, 1943, v. 40, 438]. Three trials with sporozoites failed. In two, sporozoites from infected glands (13 and 25 respectively) were inoculated intravenously into the animals, which failed to develop either an overt or a latent infection during the following 8 months. As much as 8 cc. of the chimpanzee's blood were inoculated into a neurosyphilitic with negative results. Thirty-five infected mosquitoes were allowed to bite a chimpanzee, but the animal did not develop the infection. Defibrinated human blood (16 cc.) containing *P. vivax* successfully infected an animal after intravenous inoculation. Five minutes after inoculation, parasites were found in the peripheral blood, but were not encountered again until 12 days later when one parasite was found in a thick drop. These were the only occasions when the infection was overt ; however, subinoculation of the chimpanzee's blood into a neurosyphilitic a month after the original inoculation gave rise to a typical attack of benign tertian malaria in the recipient.

These results suggest that the pre-erythrocytic forms of *P. vivax* in the anthropoid are completely obliterated, although erythrocytic parasites are just able to maintain themselves for a few weeks. The natural parasite—*P. schwetzi*—of the chimpanzee, on the contrary, is easily passaged from animal to animal ; morphologically identical with *P. vivax*, it is, however, biologically distinct.

P. C. C. Garnham

TALIAFERRO, W. H. & TALIAFERRO, Lucy G. **Asexual Reproduction of *Plasmodium knowlesi* in Rhesus Monkeys.** *J. Infect. Dis.* 1949, Sept.–Oct., v. 85, No. 2, 107–25, 6 figs. [39 refs.]

The behaviour of blood-induced infections of *P. knowlesi* was studied in 18 *Macaca mulatta* monkeys ; in particular data were collected about the number of merozoites, length of cycle and degree of parasitaemia. The monkeys were subjected to alternate light and dark periods each 12 hours long. Blood smears were taken at intervals of 3 hours or 4–10 hours and were treated with ether to facilitate the counting of merozoites (based on the average of 25 segmenters). The parasites were classified into five groups, (1) small rings, (2) intermediate trophozoites, (3) larger trophozoites, (4) schizonts with 2–4 nuclei and (5) schizonts with more than 4 nuclei. The results are analysed in considerable detail for 5 monkeys, less so for the remainder. The infections fell into two categories, progressively acute (60 per cent.) and intermittently acute (40 per cent.). Both were fatal but the latter exhibited short periods during which the density of parasites remained constant. The prepatent period lasted from 1–4 days according to the amount of the initial dose. The parasite cycle was synchronous and occupied 24 hours during the early segmentations ; later, the cycle was extended up to 30 hours apparently as the result of damage to the

parasites from the immunity response. This injury could not have been permanent, because when such late parasites were inoculated into new hosts, the typical 24-hour cycle became re-established. During the first one or two cycles the larger forms of the parasite were scarce in the peripheral blood; they were differentially retained in the internal organs—even at death, the parasite population of the liver or spleen showed a four-fold higher proportion of larger forms. Early in the infection, the number of merozoites per segmenter varied from 6 to 16; late in the disease, from 3 to 14. In one animal the merozoite mean was reduced from 11·2 to 6·4, while the cycle itself was lengthened for 4 hours—this resulted in a diminution of merozoite production by 50 per cent. A study of the degree of parasitaemia in relation to the merozoite factor showed that, to begin with, there might be a 100 per cent. survival of parasites, later it was reduced to an average of 13 per cent., the increasing death rate probably being due more to destruction of free merozoites than of intra-corpuscular stages.

There is an interesting discussion comparing these findings with the picture in other species of malarial parasites. *P. knowlesi*, *P. cathemerium*, *P. cynomolgi* and *P. gallinaceum* all show a high initial merozoite mean which drops during the acute rise to a low point and if the animal survives, rises during the developed infection. In *P. lophurae*, *P. floridense* and *P. brasilianum*, the merozoite mean remains more or less constant throughout the infection. Differences in survival rates depend also upon the degree of immunity response; in the case of *P. cynomolgi*, immunity eventually reduces survival to less than one parasite per segmenter, so that death of the host is rare; with *P. knowlesi*, on the other hand, it never reaches this figure, parasites continue to increase and death is almost invariable. *P. gallinaceum* resembles the latter, though the presence of recurring showers of exo-erythrocytic forms introduces another factor.

Immunity seems to act in two ways—there is firstly the natural immunity (non-specific) and secondly the much more important acquired immunity, due to specific antibodies. This immunity causes a gradual and progressive derangement of the parasite cycle, including a reduction in the number of merozoites and their degeneration ("crisis forms") and an increasing death rate of the organisms. *P. C. C. Garnham*

RIGDON, R. H. & BRESLIN, Dorothy. **Effect of Human Blood on** *Plasmodium knowlesi* **Infection in Monkeys.** *J. National Malaria Soc.* 1949, Dec. v. 8, No. 4, 298–308, 5 figs.

Experiments were carried out to test the effect, on monkeys infected with *P. knowlesi*, of giving human blood intramuscularly and intraperitoneally; human plasma, human haemoglobin and bovine and horse serum were also used. It was shown first that *Macaca mulatta* monkeys rarely developed sensitivity to foreign blood; the erythrocyte count rose for a few days after injection. The parasitaemia was uninfluenced by any of the substances introduced into the infected monkeys with one exception, *viz.*, whole human blood given after the infection has become patent. Three monkeys were given up to 400 cc. of human blood in divided doses during the course of the disease, and a marked decrease in the degree of parasitaemia followed. Death was delayed, and anaemia rather than parasitaemia appeared to be the more important lethal factor. The actual cause of the decreas ien parasites is unknown, though it may be due to the abnormal retention of metabolic products. *P. C. C. Garnham*

BECKER, E. R., MAROUSEK, Alice A. & BRODINE, C. E. **Observations on *Plasmodium lophurae* Infections in White Pekin Ducklings transfused with Duck and Chick Erythrocytes.** *J. National Malaria Soc.* 1949, Dec., v. 8, No. 4, 290–97.

The experiments described in this paper confirm the work of RIGDON and VARNADOE [this *Bulletin*, 1946, v. 43, 630] on the effect of transfusing erythrocytes to ducks at the peak of a *Plasmodium lophurae* infection. Instead of the parasitaemia declining, as it does in ordinary infections, the parasitaemia was maintained at a high level. In the present series, ducks were injected with washed erythrocytes from chickens, with washed erythrocytes from ducks, and with washed and unwashed erythrocytes from immune ducks. The injections were given several times daily from the fifth to as long as the 18th day of the disease. By the ninth day most control birds had died ; the transfused birds as a rule lived much longer and in some a high parasitaemia (up to 60 per cent.) persisted for three weeks or more. This degree of parasitaemia was as well maintained in birds transfused with erythrocytes from immune as it was from non-immune ducks. Chick erythrocytes proved suitable as host cells for the parasite in the duck, and immature duck erythrocytes were also found capable of harbouring *P. lophurae*.

[These experiments have an obvious bearing on the nature of immunity to *P. lophurae* in ducks. Apparently two facts emerge, (1) the reticulo-endothelial system is unable to destroy the parasites at the crisis of an infection if sufficient erythrocytes are provided for them to live in, and therefore a factor other than phagocytosis is probably normally responsible for the destruction of parasites at the crisis, and (2) immunity does not reside in the erythrocytes themselves, because transfused cells from immunized birds are as susceptible to invasion as those from the unimmunized.] *P. C. C. Garnham*

GREENBERG, J., TREMBLEY, Helen L. & COATNEY, G. R. **Effects of Drugs on *Plasmodium gallinaceum* Infections produced by Decreasing Concentrations of a Sporozoite Inoculum.** *Amer. J. Hyg.* 1950, Mar., v. 51, No. 2, 194–9, 1 fig. [17 refs.]

During the screening of antimalarial drugs in which infections were induced in chickens with the sporozoite equivalent of one infective mosquito [COATNEY *et al.* this *Bulletin*, 1946, v. 43, 629], severe infections, uninfluenced by 8-aminoquinolines, resulted. It has been noted that the number of sporozoites of human, monkey and possibly bird malaria injected, influences considerably the effect of drug treatment. The present investigation was designed to test the effect of antimalarial drugs on less severe infections with *P. gallinaceum* resulting from fewer sporozoites. Groups of 5 to 10 chickens, 8 days old of weight 50 to 65 gm., were inoculated with a sporozoite suspension in chicken serum-saline as described earlier, corresponding to 1·0 to 0·01 mosquito equivalent. Twice daily oral treatment with the drug was begun when parasites were first detected in the peripheral blood, and was continued for 14 days. Stained blood and brain smears were used to estimate the numbers of erythrocytic and exoerythrocytic parasites present. Quinine or atebrin [quinacrine, mepacrine] were unable to prevent the death of chickens caused by exoerythrocytic infections. Pamaquin [plasmoquine] saved a large percentage of the birds given the lowest dose of sporozoites, but was ineffective against the heaviest inocula. Pentaquine (an 8-aminoquinoline), chlorguanide [proguanil, paludrine] and sulphadiazine showed similar activity. Chloroquine appeared to exercise a favourable effect but results were not conclusive. All the treated birds developed chronic infections. *J. D. Fulton*

TOKURA, N., TSAI, C. W., LO, J. P. & CHEN, C. Y. **Studies on Synthetic Antimalarial Drugs. I. Effect of some Synthetic Drugs on Avian Plasmodia.** *J. Formosan Med. Ass.* 1949, Oct., v. 48, Nos. 9/10, 223–30, 7 figs.

"We gave 9 synthetic products a trial approximately according to Roehl technique against avian malaria parasites which contain 3 species, 5 strains. The results of the antimalarial activity are as follows :—

"1. The standard antimalarials, atebrin, plasmochin and paludrine have an evident antimalarial activity.

"2. 4-Aminobenzolsulfon-3, 5,-dibromanilid and 6-Methoxy-4-diethylamino-ethylaminochinoline-oxalat appear also to have effective antimalarial activity.

"3. The other drugs show no effective action."

TRYPANOSOMIASIS

TOBIE, Eleanor J., von BRAND, T. & MEHLMAN, B. **Cultural and Physiological Observations on *Trypanosoma rhodesiense* and *Trypanosoma gambiense*.** *J. Parasitology.* 1950, Feb., v. 36, No. 1, 48–54, 1 fig. [26 refs.]

After discussing various media which had been used by previous workers for the cultivation of pathogenic trypanosomes of the *brucei* group, the authors describe an improved medium which they have devised for this purpose, and for physiological studies.

Their diphasic blood agar medium is prepared as follows : (*a*) *Solid phase* : 1·5 gm. Bacto beef (Difco), 2·5 gm. Bacto-peptone (Difco) ; 4·0 gm. NaCl, and 7·5 gm. Bacto-agar (Difco) are dissolved in 500 ml. distilled water. The *p*H is adjusted to 7·2–7·4 with NaOH, and the solution is autoclaved at 15 lb. pressure, after which it is cooled to about 45°C., and whole rabbit blood (inactivated at 56°C. for 30 minutes and containing 0·5 per cent. sterile sodium citrate, to prevent coagulation) is added, in the proportion of 25 ml. blood to 75 ml. base. (*b*) *Liquid phase* : sterile Locke's solution (NaCl 8 gm., KCl 0·2 gm., $CaCl_2$ 0·2 gm., KH_2PO_4 0·3 gm., dextrose 2·5 gm., distilled water 1 litre). (*c*) The base is distributed in test tubes or flasks in amounts of 5 ml. or 25 ml. respectively, the former being kept in a slanted position and the latter upright, until the base has solidified, after which 2 ml. or 10–15 ml. respectively of the liquid phase are added, and the containers are plugged with cotton wool. Suitable human blood can be substituted for rabbit blood.

The above medium was used for stock cultures, which were incubated at 24°–25°C. The flagellates (which do not develop beyond the proventricular stage) were dispersed in the overlay, and reached maximum growth in 10–14 days, their average density being $21 \pm 0{\cdot}84$ million per ml. overlay.

For physiological studies only the overlay was used after having been in contact with the base for 6 days. Maximum growth of flagellates was obtained in 8–12 days, with an average of about 9 million per ml.

A strain of *Trypanosoma rhodesiense*, which had been maintained by mechanical transmission for 3 months, was cultivated in the solid base of the medium (made up with human blood) for 3–4 weeks, after which it was maintained in subcultures (every 1–2 weeks) for more than 2 years, In the early stages (7th subculture) rabbit blood replaced human blood and the liquid phase was added to the medium in gradually increasing amounts. However, attempts to isolate this strain in culture 2 years after the first attempt and to cultivate another old laboratory strain were unsuccessful. Comparable results were obtained with recently isolated and old laboratory strains of *T. gambiense*.

These observations confirm Reichenow's experience that passage strains soon lose their ability to grow *in vitro*. The suitability of this method of cultivation for diagnostic purposes can only be tested in the field. Some of the observations indicate that for primary isolation of a culture the addition to the medium of blood from a suitable human donor is preferable to rabbit blood.

Physiological observations made with cultures of *T. gambiense* and *T. rhodesiense* have shown that they consume glucose with the concomitant production of acid, indicating that these flagellates are aerobic fermenters. They form very little ammonia, and therefore do not utilize protein primarily by deamination. The metabolism of the African human trypanosomes was found to differ markedly from that of the American trypanosome, *T. cruzi*.

C. A. Hoare

FAIRBAIRN, H. & CULWICK, A. T. **The Transmission of the Polymorphic Trypanosomes.** *Acta Tropica*. Basle. 1950, v. 7, No. 1, 19–47, 3 figs. [44 refs.]

A review of the literature on the experimental transmission of polymorphic trypanosomes by tsetse flies led the authors of this paper to conclude that the various experimental results were "largely contradictory"; they examined the figures by statistical methods and believe that the contradictions are mainly due to the anatomical and physiological differences in the tsetse flies caused by varying external conditions to which they were exposed during their development and, in some cases, afterwards. The chief influence was the air temperature acting especially on the pupal stage. At Tinde Research Laboratory, Tanganyika Territory, records of the air temperature have been kept for several years, and experiments have been made there to determine the influence of temperature on the transmission of *Trypanosoma rhodesiense* by *Glossina morsitans*. In 1943–4, BURTT [this *Bulletin*, 1946, v. 43, 827] found that incubation of the pupae at 30°C. produced a much higher rate of infection in the flies than occurred when the pupae were kept at the variable but usually lower laboratory temperature. During the whole of 1948 the authors incubated pupae at 28°C. and found that this also increased the infection rate in the flies though less so than incubation at 30°C. The influence on the pupae was shown in both sexes, but examination of the records of the various laboratory temperatures at which the adult flies were kept during experiments showed that increased temperature applied to the flies increased the infection rate in females only. The development of the trypanosomes was quicker in male flies hatched from pupae incubated at 30°C. and 28°C. than in other male flies; in female flies sufficient data were lacking. FAIRBAIRN [this *Bulletin*, 1948, v. 45, 1] concluded that atmospheric temperature was one of the factors affecting the incidence of Rhodesian sleeping sickness in Tanganyika Territory. The authors say also that the species of infected animal (*e.g.*, a kind of reedbuck) on which the flies feed seems to influence the infection rate in the flies, but they attach less importance to this than others have done.

For laboratory experiments they advise that pupae of *G. morsitans* should be incubated at 30°C. (the incubator containing a dish of water) and that the hatched-out flies should be kept at 28°C. and about 80 per cent. relative humidity; about 17 per cent. of both sexes should then become infective.

Heat applied to the pupae and flies does seem to make the flies less resistant to infection with polymorphic trypanosomes (and *T. congolense*, see Burtt, *loc. cit.*) but the varying rates of infection obtained in the experiments seem to show that other factors are important—perhaps variation in the trypanosomes and flies and in the animals which the flies bite as has been often suggested.

If the method of incubation suggested by the authors is found to give consistently an infection rate of about 17 per cent., the preponderating influence of air temperature would be demonstrated ; it will no doubt be tested. Burtt (personal communication) suggests that air temperature may play a similar important part in other diseases spread by arthropods.] *J. F. Corson*

MOGGRIDGE, J. Y. **Observations on the Control of Kenya Coast** *Glossina*. *Bull. Entom. Res.* 1949, Dec., v. 40, Pt. 3, 345–9, 4 figs. on 1 pl.

An experiment to observe the effect of discriminative clearing was conducted in an area nearly 100 acres in extent on the Kenya coast. Close-growing thicket, climbers and woody growth were removed, leaving the shrubs and trees untouched. Cut vegetation was dried and burnt and the resultant leafless state of the canopy intensified the dry season conditions in this experimental block. Clearings between 140 and 200 yards broad were made on three sides of the block ; the remaining side was adjacent to a landing ground. Regeneration of grass and succulents was rapid in the wet season, but in practice the grazing of stock would keep these in check.

Before the experiment, the density of *Glossina pallidipes* was 70 per cent., of *G. brevipalpis* 3 and of *G. austeni* 18. Catches beginning a month after clearing was completed showed a very great reduction in the density of tsetses, as compared with catches in adjacent control bush, though the decrease was not maintained during the wet season in regard to *G. pallidipes* because of infiltration through the inadequate barrier clearings. Hourly figures for catches were as follows : *G. pallidipes*, dry season 0·4 (control 33), wet 10 (control 82) ; *G. austeni*, dry season 0·4 (control 51), wet 0 (control 30) ; and *G. brevipalpis* dry season 0 (control 3) wet 0 (control 1). Swynnerton and Harris traps proved ineffective in the same area of bush ; 2 African children caught more *G. pallidipes* in the savannah in 30 seconds than the best trap was able to capture in 60 minutes. *P. C. C. Garnham*

ROUBAUD, E., COLAS-BELCOUR, J. & RAGEAU, J. Essai sur le pouvoir infectant naturel des *Glossina palpalis* aux environs de Yaoundé (Cameroun français). [**Natural Infection Rate of** *Glossina palpalis* **in the Yaoundé Region (French Cameroons).**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 50–53.

The following is a translation of the authors' summary :—

We have detected the presence of natural infections of several *Glossina palpalis* by *Trypanosoma congolense* in the suburban region of Yaoundé : *T. congolense* appears to be the widespread trypanosome in this sector.

H. J. O'D. Burke-Gaffney

BURTT, E. **An Illustration of the Appearance presented by Trypanosome Colonies occurring on the Proboscis and in the Salivary Glands of a Tsetse-Fly.** *Acta Tropica.* Basle. 1950, v. 7, No. 1, 61–2, 1 folding fig.

"This figure shows, from the ventral aspect, the proboscis and attached salivary glands of a wild *G. brevipalpis*. . . . The example portrayed bore a double infection of *T. vivax* (probably) on the labrum, together with one of *T. brucei* in the salivary gland on the left. Such a unilateral infection was of comparatively rare occurrence." The drawing is on a large scale, measuring about 14 × 5 inches, and the different parts are shown by appropriate letters.

J. F. Corson

SCHOENAERS, F. Réceptivité du daman (*Dendrohyrax arborea adolfi-friederici*) à *Trypanosoma vivax*. [**Susceptibility of the Daman** (*Dendrohyrax arborea adolfi-friederici*) **to** *Trypanosoma vivax*.] *Ann. Soc. Belge de Méd. Trop.* 1950, **Mar. 31, v. 30, No. 1, 69–70.**

MAYER, M. & PIFANO C., F. Observaciones sobre un Trypanosoma del tipo *Trypanosoma duttoni* en ratones blancos de Venezuela. [**Observations on a Trypanosome of the** *Trypanosoma duttoni* **Type in White Rats in Venezuela.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, **159–65, 2 figs. English summary.**

MAYER, M. Observaciones sobre el *Trypanosoma venezuelense*. [**Observations on** *Trypanosoma venezuelense*.] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 166–9. English summary.

HAUSCHKA, T. S., GOODWIN, Margaret B., PALMQUIST, Jean & BROWN, Elizabeth. **Immunological Relationship between Seven Strains of** *Trypanosoma cruzi* **and its application in the Diagnosis of Chagas' Disease.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 1–16, 4 figs. (3 on pl.). [34 refs.]

The authors describe the results of an investigation on the immunological inter-relations between seven strains of *Trypanosoma cruzi*, which were maintained in mice and in culture (Johnson's diphasic medium). In the case of cultures, 80 cc. of Ringer-Locke overlay were left in contact with 50 cc. defibrinated rabbit blood-agar base for 48 hours, after which the liquid was distributed in 5 cc. amounts into culture tubes. Sub-cultures in the liquid medium were made every 10 days and kept at 24°C.

The strains used were as follows: (*a*) lethal passage strain (*WBH*); (*b*) virulent relapse strain (*Brazil*); (*c, d, e, f, g*) avirulent relapse strains (*Culbertson, Monkey, Tatu, Panama, Texas* respectively). References to these will be made by the corresponding letters.]

For tests on the protective effect of prior infection against strain *a*, mice were dealt with as follows :—

(1) Mice inoculated with *a* were treated with "Bayer 7602": this resulted in a high percentage of cured mice, which were kept for further tests; (2) mice inoculated with blood containing *b* were treated as above; (3) mice inoculated with sublethal doses of *b* were allowed to recover without treatment; (4–8) mice inoculated with *c, g, f, d, e* were not treated.

The effectiveness of protection of these mice against *a* was assessed by survival, weight, parasite counts and degree of tissue infection.

Killed *T. cruzi* antigens were prepared chiefly by exposing the trypanosomes to 0·3 per cent. formalin in isotonic Ringer-Locke solution, then washing by centrifugation and resuspending in the same solution at a concentration of about 80 million trypanosomes per cc. For testing the immunizing properties of these antigens, suspensions of dead trypanosomes belonging to strains *a, f, g* were injected into mice subcutaneously over a period of 3 weeks, followed a week later by a lethal dose of *a*.

For agglutination tests between various strains and for sero-diagnosis of human infection, drops of test antigens (mostly living cultures) on slides in Petri moist chambers were mixed with equal amounts of serially diluted antiserum. The results (agglutination and lysis) were read at different intervals and compared with controls. Murine antisera were obtained from the blood of animals which had recovered after infection, either spontaneously or as the

result of treatment. Passive immunization of mice was also attempted. Human antisera were prepared from chronic cases of Chagas's disease in Brazil.

The results of these experiments were as follows. The seven strains of *T. cruzi* proved to be immunologically inter-related, for after spontaneous or drug-induced recovery from infection with any of these strains mice were protected against repeated attempts to reinfect them with the lethal *a* strain, which killed controls within 13 days. Attempts to produce passive immunization and immunization with killed antigens were unsuccessful. The slide-agglutination method, employed with cultures of 6 strains tested against as many undiluted mouse antisera, revealed complete antigenic cross-relationship between them. The agglutination reaction was evident after an exposure of 5 minutes, attaining maximum effect after 20 minutes. Lysins of low titre were demonstrated in mouse antisera against cultures of several trypanosome strains.

The results of diagnostic tests with sera from cases of human Chagas's disease were inconclusive, for it was shown that, while normal mouse serum never agglutinated *T. cruzi*, normal human serum possessed non-specific agglutinating properties at dilutions of 1 : 10 and 1 : 100. All cultured strains of *T. cruzi* reacted to sera of Chagas patients, producing slide-agglutination within 8 minutes, the sera remaining active after storage for one month at 2°C. However, since there was no marked difference in the reaction of some *cruzi* strains to normal sera and antisera at a dilution of 1 : 100, this reaction is not suitable for the diagnosis of American trypanosomiasis, though one strain (*Culbertson*) proved to be refractory to agglutinins in normal human serum but highly susceptible to the sera of patients suffering from Chagas's disease. Cultures of this strain can therefore be used for the diagnosis of the disease with serum diluted to 1 : 100.

The authors conclude that, since passive immunization and prolonged treatment with killed antigens failed to protect mice, effective protection does not depend on agglutinins, but the principal part in the defence mechanism would seem to be due to a lytic antibody. *C. A. Hoare*

EMMETT, J. **Effect of X-Radiation on** *Trypanosoma cruzi*. *J. Parasitology*. 1950, Feb., v. 36, No. 1, 45–7.

The author records the results of exposure of *Trypanosoma cruzi* to X-rays in experiments carried out with the view of the eventual treatment of Chagas's disease with radioactive substances. Virulent N.N.N. cultures of the trypanosome in Pyrex test tubes were exposed to X-rays on a 180 K.V. machine, with the use of two unfiltered tubes at 14·8 cm. This apparatus was capable of producing 10,000 r in 5 minutes. After exposure for different periods of time, 0·5 cc. of the culture was inoculated intraperitoneally into white mice, while untreated cultures were injected into control animals. The cultures, which were kept in the dark at room temperature, were examined before and after irradiation for viability and numbers of trypanosomes. Detection of trypanosomes in the peripheral blood of the animals served as a criterion of successful infection. A comparison of the radio-sensitivity of *T. cruzi* with that of *T. gambiense*, as reported by other authors, showed that while doses of 12,000 r rendered the latter non-infective, the infectivity of the former could only be destroyed at dosages between 51,000 r and 100,000 r. But, although infectivity was affected, the viability and reproductive power of the cultures were not impaired by irradiation (100,000 r). However, cultures thus irradiated regained their infectivity after a month or more, from which it would appear that the effects of irradiation are not transmitted to successive generations of trypanosomes. *C. A. Hoare*

BELTRÁN, E. & PÉREZ, R. Hallazgo de *Schizotrypanum cruzi* en una rata (*Rattus norvegicus*) en la Ciudad de Mexico. [*Trypanosoma cruzi* **in a Rat in Mexico City.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Sept., v. 10, No. 3, 235–8, 1 fig. [11 refs.]

The English summary appended to the paper is as follows :—

"While studying the parasitic protozoa of brown rats (*Rattus norvegicus*) at Mexico City, there was found one specimen harboring *Schizotrypanum cruzi* in its blood. It is the first time a parasitized brown rat is found in the Republic of Mexico, and the first report of a reservoir mammal for *S. cruzi* at Mexico City."

NOÉ C., J. & SILVA C., R. Una nueva variedad de *Triatoma infestans*, Klug, 1834. [**A New Variety of** *Triatoma infestans*.] *Bol. Informaciones Parasitarias Chilenas.* 1949, Jan.–Mar., v. 4, No. 1, 4–5.

The specimen was caught in Chile.

DEANE, Maria P. Um método para manter colônias de Triatomídeos em labóratorios. [**A Method for maintaining Colonies of Triatomid Bugs in the Laboratory**] *Rev. Servico Especial de Saúde Pública.* Rio de Janeiro. 1948, Dec., v. 2, No. 2, 493–6.

The English summary appended to the paper is as follows :—

"Special containers are described for the maintenance of colonies of triatomid bugs in the laboratory. By this method there is no need to introduce animals into the cage for the bugs to feed on ; therefore, the colonies may be kept cleaner than by the usual methods. The description is followed by illustrations showing the containers and the manner in which the bugs feed on a guinea pig."

MARTINS, F. Modificações verificadas em sorodiagnósticos da doença de Chagas com o iodeto de sódio. [**The Effect of Iodide of Sodium on Complement Fixation in Chagas's Disease.**] *Med. Cirurg. Farmacia.* 1949, Nov., No. 163, 656–9.

The author has found that intravenous injection of a 20 per cent. solution of sodium iodide results in negativing a previously positive Machado-Guerreiro reaction in Chagas's disease. He injects, first, 5 cc. (equivalent to 1 gm. of the salt) to test susceptibility. [He had previously given the salt *per os* but, to obtain a stronger reaction, changed to the venous route.] No untoward symptoms followed, so he gave 10 cc., then 15 cc., and, finally, the full ampoule of 20 cc. (4 gm. of the salt) and continued this daily until 70 gm. had been given. One patient had 99 gm. without showing any signs of intolerance. On testing the Machado-Guerreiro reaction he found it had become negative. He ventures no opinion, but makes the suggestion that, this serological result being what it is, it may be that the method might prove effective in treatment and hopes that it may be tried by others. *H. Harold Scott*

PIFANO C., F. & MAYER, M. Hallazgo de formas evolutivas del *Trypanosoma rangeli* en el jugo de la trompa de *Rhodnius prolixus* de Venezuela. [**Developmental Forms of** *Trypanosoma rangeli* **in the Fluid from the Proboscis of** *Rhodnius prolixus* **in Venezuela.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 153–8, 1 fig.

The English summary appended to the paper is as follows :—

"The authors have found in the fluid from the proboscis of *Rhodnius prolixus* of Venezuela, which were infected themselves by the natural way with *Trypanosoma rangeli* : trypanosoma-forms ; crithidia-forms partly in division ; also

oval enrolled forms showing sometimes a cystlike picture in a very big number. Apparently this might be a evolutive cycle, that speaks in favor of transmissions by the bite, and clarifies perhaps that the intestinal forms in our experiments could not infect animals until today."

LEISHMANIASIS

ADLER, S. **The Metabolism of** *Leishmania donovani*. [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Mar., v. 43, No. 5, 553–4.

The author refers to the paper of FULTON and JOYNER [this *Bulletin*, 1950, v. 47, 529] in which they state "but in contrast to the findings of ADLER *et al.* (1948) our results show that the respiration of Leishman-Donovan bodies was less susceptible to the action of amidines than that of the flagellates."

Dr. Adler now points out that in the paper referred to by Fulton and Joyner, he and his colleagues made no statement on the effect of amidines on the respiration of L.D. bodies or flagellates. They stated that under specific conditions (which are defined in this letter) the aromatic diamidines which they tested were more effective in inhibiting multiplication in cultures made from L.D. bodies than in those from flagellates: examples are given.

Dr. Adler adds that his findings warrant the conclusion that L.D. bodies are more sensitive to aromatic diamidines than are flagellates: apparently the effect on oxygen uptake is not the only factor in the lethal action of these drugs on leishmania. *H. J. O'D. Burke-Gaffney*

CORKILL, N. L. **The Activation of Latent Kala-Azar in relation to Protein Metabolism.** *Ann. Trop. Med. & Parasit.* 1949, Dec., v. 43, Nos. 3/4, 261–7.

Accepting the suggestion that "kala-azar is probably only the clinical expression, determined by some secondary factor, of an infection which in the endemic areas is much more widespread than the disease itself" [NAPIER and KRISHNAN, this *Bulletin*, 1932, v. 29, 495], the author has shown that "there are grounds for believing that this secondary factor may be the breakdown of the body's protein in certain physiological states."

He has noted in the Sudan the frequency with which kala azar is associated with malaria, typhoid, the dysenteries, pneumonia, influenza, typhus, relapsing fever [this *Bulletin*, 1949, v. 46, 22] and brucellosis. He also believes that emotional stress [*ibid.* 21], physical trauma, and pregnancy may activate the disease. He draws attention to the fact that some of the earliest recognized epidemics of kala azar were associated with pandemics and earthquakes, and that cold apparently determines the onset.

A factor which is common to all these conditions is an increase of protein breakdown. Malnutrition and consequent low plasma protein are also associated with kala azar.

"Activation of kala-azar from latency appears to depend on a breakdown in the parasite-host balance due to an inadequacy of protein available for the synthesis of appropriate antibody. This antibody protein, gamma-globulin, being specific, presumably has a specific amino-acid structure, and thus certain amino-acids are required, in appropriate quantities, either from the pool of degraded protein in the body or in the diet, in excess of calorigenic demands."

"If, for any reason, an infected subject cannot produce his antibodies in adequate quantities, i.e. if he has an inadequate protein reserve in his body, or a poor intake of protein in his food, or both, then parasite-host balance may be considered as failing, and there results fulmination of the disease, termination of the incubation-period, activation from latency, or relapse."

L. E. Napier

LE BOURDELLÈS, B. Paludisme et kala-azar. Valeur diagnostique de l'électroprotéinogramme. [**Malaria and Kala Azar. The Diagnostic Value of the Electrophoretic Pattern (Electroprotéinogramme).**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1949, Nos. 23/24, 888–90.

At the session of the Society on 18th March M. D'ESHOUGUES reported a case of kala azar in which no parasites could be found, but the diagnosis was confirmed by the satisfactory result of antimony treatment (this *Bulletin*, 1949, v. 46, 1132). On the other hand, at the session on 12th May M. GIRARD maintained that the diagnosis should always be confirmed parasitologically, and that if the parasites were there one very rarely failed to find them. The author reports a case which is relevant to this discussion and again raises the question of the value of the electrophoretic pattern in the differential diagnosis of kala azar and other splenomegalies. With the use of a modification of Chorine's technique for serum flocculation in water by which an exact measurement of the density of the flocculation can be made in a Vernes photometer, he has found (LE BOURDELLÈS and MAUVAIS, *C. R. Soc. Biol.*, 1938, v. 127, 767) that sera from cases of kala azar often give a reading of 200, compared with a reading up to 50 for malaria. He has also, elsewhere, confirmed the finding of massive gamma-globulinaemia reported by COOPER, REIN and BEARD [this *Bulletin*, 1946, v. 43, 1027].

He considers that it is reasonable to assume that the dense flocculation in sera from cases of kala azar serum is due to some element in the gamma globulins.

The patient in the present case, who was in a hospital at Lille in August, 1948, had arrived from North Africa about eight months previously. He had a large spleen, a hand's breadth below the costal margin, and a slightly enlarged liver. His temperature remained normal while he was in hospital (several weeks). He had a leucopenia with inversion of the polymorphonuclear-lymphocyte ratio; the formo-leuco-gel reaction was strongly positive; and the hydroflocculation with the Vernes electrophotometer gave a reading of 302. All attempts to find parasites in the blood, spleen pulp and marrow were negative. After a slight response to quinine, the patient left hospital and was lost sight of.

The diagnosis lies between kala azar in remission and malaria associated with marked hepato-splenomegaly, but the author has never seen a case of malaria in which the hydroflocculation was over 100. He considers that this case illustrates the value of the electrophoretic pattern in differentiating kala azar and chronic malaria.

L. E. Napier

MAYER, M., CONVIT, J. & PIFANO, C., F. Estudios experimentales con una cepa de *Leishmania brasiliensis* proveniente de un caso de leishmaniasis tegumentaria diseminada de aspecto lepromatoso. [**Experimental Studies with a Strain of *Leishmania brasiliensis* from a Case of Disseminated Lepromatous-like Cutaneous Leishmaniasis.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 183–92, 5 figs.

The English summary appended to the paper is as follows:—

"The present article is based on experimental Leishmaniasis in the mouse carried out with a strain of *Leishmania brasiliensis* obtained from an individual

affected with disseminated lepra-lepromatous-like skin lesions. The mice were inoculated intradermally with tissue fluid from the lesion in the base of the tail. Local lesions were produced which revealed extremely abundant parasites. The strain has been kept up since in white mice. Up to now six successive transfers have been made. The period of incubation in the mouse injected initially with the human material has been of three months. In subsequent animal to animal transfers it has been some times shorter. Some mice never presented visible lesion at the site of inoculation, but tissue juice from the same site revealed abundant parasites which produced the infection in other animal when inoculated."

FEVERS OF THE TYPHUS GROUP

WILDER, R. M. **The Rickettsial Diseases : Discovery and Conquest. Howard Taylor Ricketts Award Lecture.** *Arch. Pathology.* 1950, Apr., v. 49, No. 4, 479–89. [23 refs.]

SIEGERT, R. Biologische Eigenschaften des Rickettsien-Giftes. [**The Biological Properties of the Rickettsial Toxins.**] *Zent. f. Bakt.* I. Abt. Orig. 1949, Sept. 23, v. 154, Nos. 6/7, Bericht pp. 172*–5*.

This is a critical discussion of existing knowledge of the rickettsial toxins, which the author regards as differing in certain essential respects from bacterial toxins and as having a ferment-like action.

Electron-microscope studies are regarded as pointing to the special concentration of the toxins in the outer layers of the organisms.

The discussion is in general terms, no references are given to the literature and no mention is made of any experimental work by the author.

In a discussion of the paper MOOSER stressed the difference between immunity resulting from rickettsial infection and that resulting from vaccination with killed rickettsiae : in the case of *Rickettsia prowazeki* and *R. mooseri* infection with either strain caused immunity against the other, whereas vaccination caused only homologous immunity : he argued that cross-immunity after infection did not by itself indicate the identity of two strains of rickettsiae.

John W. D. Megaw

GIROUD, P. & VARGUES, R. Valeur et limites de la réaction d'agglutination des rickettsies. [**The Value and Limitations of the Rickettsia-Agglutination Test.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 19–23.

The authors conclude that the rickettsia-agglutination test will yield an accurate differential diagnosis of the fevers of the typhus group in 80 per cent. of cases, provided that the test is carried out in a specialized laboratory on two or three occasions at weekly intervals. In the case of Q fever, the test is of special value because, apart from the complement-fixation test, it is the only available serological test.

The authors regard the Weil-Felix test as the most satisfactory for everyday use, except for Q fever in which it has only a negative value, but it does not help in differential diagnosis of the louse-borne, flea-borne and tick-borne typhus fevers.

The paper contains details of the methods of preparing rickettsial suspensions and specific sera for use in carrying out the test.

Suspensions made from rickettsiae which have been passed several times through mice or guineapigs are more strictly specific than those made from recently isolated organisms. *John W. D. Megaw*

GIROUD, P., CIACCIO, C. & PAN, H. S. Action rickettsiocide et rickettsiostatique de la chloromycétine. [**The Rickettsiocidal and Rickettsiostatic Action of Chloromycetin.**] *C. R. Soc. Biol.* 1949, Nov., v. 143, Nos. 21/22, 1438–9.

Rickettsial suspensions obtained from the lungs of mice infected by the intranasal route with *Rickettsia prowazeki* were treated with solutions of chloromycetin for two-and-a-half hours at 22°C., then washed, centrifuged, resuspended and injected intradermally into rabbits. The local reactions observed on the 4th day were only about one-tenth as pronounced as those caused by corresponding quantities of untreated rickettsiae.

The authors conclude that the drug has rickettsiocidal as well as rickettsiostatic action. *John W. D. Megaw*

GIROUD, P., CIACCIO, G. & VARGUES, R. Comparaison dans la peau du lapin de l'action de l'auréomycine et de la chloromycétine vis-à-vis des rickettsies épidémiques ou murines. [**Rabbit Intradermal Reactions in Comparative Tests of the Action of Aureomycin and Chloromycetin on Epidemic and Murine Rickettsiae.**] *C. R. Soc. Biol.* 1949, Nov., v. 143, Nos. 21/22, 1439–40.

Employing the Giroud rabbit-intradermal test the authors have carried out comparative trials which show that aureomycin and chloromycetin have a potent action on rickettsiae: the former drug seemed to be more potent than the latter. Two methods of testing were employed: (1) various doses of rickettsial suspensions were treated with fixed or varying doses of each drug and then injected intradermally into rabbits: (2) the rickettsiae alone were injected intradermally into rabbits which were treated simultaneously with the drugs. *John W. D. Megaw*

GIROUD, P. & CIACCIO, G. Pouvoir pathogène et antigène comparé des rickettsies épidémiques, murines traitées ou non par la chloromycétine. [**The Effect of Chloromycetin on the Pathogenic as compared with the Antigenic Potency of Epidemic and Murine Rickettsiae.**] *C. R. Soc. Biol.* 1949, v. 143, Nos. 21/22, 1471–3.

The authors found that rabbits inoculated intradermally with chloromycetin-treated rickettsial suspensions later developed rickettsia-agglutinating antigens which rose to much the same titres as were observed in rabbits inoculated with untreated suspensions. The pathogenic action of the treated suspensions was greatly reduced.

The conclusion reached was that chloromycetin though rickettsiocidal for the suspensions did not modify the antigenic action of the rickettsiae.

John W. D. Megaw

DONZELOT, E. & KAUFMANN, H. L'endocardite subaiguë d'apparence primitive, complication tardive du typhus exanthématique. [**Subacute, apparently Primary, Endocarditis as a Late Complication of Epidemic Typhus.**] *Bull. Acad. Nat. Méd.* 1950, v. 134, Nos. 3/4, 55–7.

Among 190 cases of infectious endocarditis the authors found 23 which they regarded as having resulted from typhus fever for the following reasons:

(*a*) they were primary : (*b*) all but one of the patients had been deported from France or had been prisoners of war in Germany or had lived in North Africa : (*c*) there was evidence of a previous attack of typhus fever in three cases, and in five out of six cases in which the serum was investigated at the Pasteur Institute the serum-protection test was positive though none of the patients had been recently vaccinated against typhus fever. *John W. D. Megaw*

BHANSALI, K. M. & KOTHARI, G. J. **Typhus in Bombay.** *Indian J. Med. Sci.* 1950, Feb., v. 4, No. 2, 41–7. [14 refs.]

The author describes the chief features of 42 cases of typhus fever observed in a hospital in Bombay. There was only one death.

The Weil-Felix reaction was of the *Proteus OX19* type in 40 of the cases, and of the *OXK* type in the remaining two, which were regarded as being of scrub typhus. A rash was seen in only six cases. One of the two patients with scrub typhus had an eschar with local lymphadenitis.

Guineapig inoculations were carried out in three cases : a Neill-Mooser reaction occurred in each case and tunica scrapings contained numerous rickettsiae in Mooser cells.

The disease was distributed all over the city, but chiefly in the mill areas in which rats were most numerous. *John W. D. Megaw*

HARRISON, J. L. **The Domestic Rats of Malaya.** *Med. J. Malaya.* 1949, Dec., v. 4, No. 2, 96–105, 4 figs. on pls.

Although this paper makes a special appeal to workers in Malaya it will be found interesting and instructive by the many medical men elsewhere who have been perplexed by the confusing nomenclature of rats and related animals.

The author describes the following, which are the six common house and field animals of Malaya popularly called " rats ".

A. Rodentia : Muridae.

(1) *Rattus rattus* (Sp. *R.r. diardi* ; *R. r. argentiventer* ; *R. r. jalorensis.* (2) *R. norvegicus.* (3) *R. exulans.* (4) *Mus musculus.* (5) *Bandicota bengalensis.*

B. Insectivora : Soricidae.

(6) *Suncus caeruleus*, the musk shrew which is grossly slandered by being called a rat ; it is an insectivore and the author states that there is no evidence of its being concerned in the transmission of any disease.

A clear description is given of the habits, external appearance, skull characters, and association, if any, with disease, of each of the above animals.

The animals chiefly concerned in the transmission of disease in Malaya are stated as being *R. r. diardi* (murine typhus). and *R. r. argentiventer*, (scrub typhus and probably leptospirosis). Plague is not occurring at present in Malaya.

Medical men in Malaya are fortunate in being provided in this and other papers with simple practical guides to the local fauna which are important from the public health point of view. [See also this *Bulletin*, 1949, v. 46, 245, 247.] *John W. D. Megaw*

See also p. 621, YEH & DAVIS, **Seasonal Changes in Abundance of Fleas on Rats at Baltimore, Md.**

See also p. 622, SCHEIN, **Field Test of the Efficiency of the Rodenticide Compound W.A.R.F. 42.**

GISPEN, R. Het aandeel van ratten en mijten in de overbrenging van epidemische scrubtyphus in Batavia. [**The Rôle of Mites and Rats in the Spread of Scrub Typhus in Batavia.**] *Med. Maandblad.* Djakarta. 1950, Feb. 1, v. 3, No. 2, 45–58, 2 figs. on pl. [16 refs.] English summary.

The author and his colleagues have already described an outbreak of scrub typhus in the area in which the present epidemiological study has been carried out [see this *Bulletin*, 1949, v. 46, 1024].

In a search of 342 rats and 59 shrews the mite *Schöngastia indica* alone was found to be ubiquitous and plentiful in the uninfected town; it was also present, though in much smaller numbers, on animals in the infected area which was overgrown with *alang grass*. Two other mites, *Schöngastia pseudoschüffneri* and *Walchia glabrum*, were found in small numbers in the infected and uninfected areas.

Trombicula akamushi was found on only 10 of the 401 animals and all the 10 hosts were captured in the scrub-typhus area.

Suspensions of 1,540 larvae of *S. indica*, 639 ticks, 177 fleas, and 33 lice from rats and shrews caught in different local areas were used to inoculate 54 guineapigs and 212 white mice, but no strain of *Rickettsia orientalis* was isolated though "strains of another less pathogenic *Rickettsia* species" were isolated from several of the ectoparasites, including *S. indica*.

Suspensions of brains and spleens of 247 rats and 25 shrews were tested by animal inoculation: from four house rats (*Rattus rattus diardi*) captured in the affected area a strain of *R. orientalis* was isolated.

The very low infection rate ($\pm$ 1·0) among the rats of the infected area corresponds with the low *T. akamushi* index (0·14), and the author believes that the infection of the house rats was accidental and did not indicate that this rat was a local reservoir of infection. *John W. D. Megaw*

FRANCO, R. Étude expérimentale du scrub-typhus en Sud-Annam. Sensibilité du cobaye inoculé par voie péritonéale. [**Experimental Study of Scrub Typhus in South Annam. Reactions in Guineapigs after Intraperitoneal Inoculation.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 24–8.

The author describes cases of scrub typhus in South Annam as occurring in two forms, "nervous forms of varying severity and boutonneuse fever with an inoculation ulcer". The reactions of guineapigs to inoculation with blood from both types of cases were the same so it was concluded that the two clinical types were aetiologically similar.

[The use of the name boutonneuse fever for a form of scrub typhus seems inappropriate.] *John W. D. Megaw*

SMADEL, J. E., TRAUB, R., FRICK, L. P., DIERCKS, F. H. & BAILEY, C. A. **Chloramphenicol (Chloromycetin) in the Chemoprophylaxis of Scrub Typhus (Tsutsugamushi Disease). III. Suppression of Overt Disease by Prophylactic Regimens of Four-Week Duration.** *Amer. J. Hyg.* 1950, Mar., v. 51, No. 2, 216–28, 4 figs.

This study was in continuation of an investigation already reviewed [see this *Bulletin*, 1949, v. 46, 1136].

In view of the numerous relapses that followed the earlier tests of the prophylactic effect of chloromycetin it was decided to give doses of 3·0 or 4·0 gm.

at intervals of 4–7 days over a period of 4–6 weeks, the first dose being given on the last of the six days of exposure to infection.

In one experiment, 13 out of 18 volunteers of the control group were attacked by scrub typhus between the 10th and 14th day after the end of the exposure period. Among the 31 volunteers who received the drug at weekly intervals for four to six weeks, only one had to be hospitalized, but the disease was not completely suppressed, 17 out of the 31 had one to three brief spells of fever while still receiving weekly doses of the drug, eight developed eschars, and from eight out of the 13 that were tested rickettsiae were isolated from the blood. No attack of fever occurred after the last dose was given.

John W. D. Megaw

SMADEL, J. E., BAILEY, C. A. & DIERCKS, F. H. **Chloramphenicol (Chloromycetin) in the Chemoprophylaxis of Scrub Typhus (Tsutsugamushi Disease). IV. Relapses of Scrub Typhus in Treated Volunteers and their Prevention.** *Amer. J. Hyg.* 1950, Mar., v. 51, No. 2, 229–41, 5 figs.

The authors describe and discuss the remarkably high relapse rate among scrub-typhus patients who have been treated promptly for attacks contracted through deliberate exposure to infection in hyperendemic areas.

It was found that relapses occurred in 12 out of 26 patients who had received 5·0 to 6·0 gm. chloramphenicol given in the course of 24 hours, and in 8 out of 10 who had received single doses of 3·5 to 4·0 gm. The relapses occurred 5 to 16 days after the first dose of the drug. After single doses of 3·5 gm. aureomycin given 3 to 4 days after the onset relapses occurred in two out of four cases.

The above patients received their treatment on the average 3·1 days after the onset, whereas among naturally infected patients the average delay in starting treatment was 6·2 days.

The authors discuss the various factors connected with the high relapse rate in these cases and conclude that no single factor has been proved to be of paramount importance. They recommend early treatment with a dose of about 6·0 gm. chloramphenicol or aureomycin given over a period of 24 hours, followed by a further course of 3·0 to 4·0 gm. if signs of relapse occur.

John W. D. Megaw

TRAUB, R. & FRICK, L. P. **Chloramphenicol (Chloromycetin) in the Chemoprophylaxis of Scrub Typhus (Tsutsugamushi Disease). V. Relation of Number of Vector Mites in Hyperendemic Areas to Infection Rates in Exposed Volunteers.** *Amer. J. Hyg.* 1950, Mar., v. 51, No. 2, 242–7. [10 refs.]

The trials referred to in the previous papers gave the authors an opportunity of studying the relationship between the prevalence of vector mites (*Trombicula akamushi* and *T. deliensis*) and the infection rates.

During the trials carried out after heavy rainfall in which the infection rates were high, the vector-mite population was ten times higher than during the trials in dry periods in which infection rates were low.

The mite population was estimated by examining rats trapped in the areas and also by exposing laboratory white rats in cages in the same areas.

The observations agree with those of AUDY in Manipur and Burma, where the incidence of the disease was definitely associated with rainy weather [this *Bulletin*, 1948, v. 45, 62].

John W. D. Megaw

PELLISSIER, A., TROQUEREAU, P. & TRINQUIER, E. Études sur les rickettsioses humaines et animales en Afrique Équatoriale Française. II. Une rickettsiose du chien, fièvre exanthématique animale. [**Studies of the Human and Animal Rickettsial Diseases of French Equatorial Africa. II. A Rickettsial Disease of the Dog : Animal Typhus.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 65–76.

The authors describe an extensive experimental study of a rickettsia of which three strains have been isolated from dogs suffering from a special kind of rickettsial disease of which two forms are described.

There was no cross-immunity against murine, boutonneuse or " Congolese red fever " infection, and the author concludes that the rickettsia belongs to the " boutonneuse-Rocky-Mountain-spotted-fever group ".

A strain of the organism was isolated from a tick (*Rhipicephalus sanguineus*) taken from a dog suffering from the disease.

Those interested must read the original paper : the interpretation of the experimental findings is not altogether free from doubt and further study of the antigenic properties of the organism seems to be desirable.

John W. D. Megaw

CROCKER, T. T., BENNETT, B. L., JACKSON, E. B., SNYDER, M. J., SMADEL, J. E., GAULD, R. L. & GORDON, M. K. **Siberian Tick Typhus. Relation of the Russian Strains to** *Rickettsia prowazeki*. *Pub. Health Rep.* Wash. 1950, Mar. 24, v. 65, No. 12, 383–94. [17 refs.]

Siberian tick typhus, also known as tick typhus, tick-borne typhus and Far-East typhus, has been recognized for 10 years as a rickettsial disease.

Cases have been reported from Central Asia, Central Siberia, and the Maritime Provinces of the South-Eastern Area of Siberia.

The authors give a succinct summary of what is known about the disease, which in its clinical features seems to resemble boutonneuse fever. The Weil-Felix reaction is usually positive by the 10th or 12th day, sometimes before the end of the first week ; the *Proteus OX19* titre may be as high as 1–6,400 : the *OX2* titre is lower, 1–25 to 1–400.

Rickettsiae have been isolated from man, ticks and rodents. All but one of the Russian workers quoted describe a scrotal reaction as occurring in about 40 per cent. of male guineapigs. Immunological differences between various strains have been described ; one strain is said to have no cross immunity with epidemic typhus and boutonneuse fever, another is said to show partial cross immunity with these strains.

Four strains were received from Russia during 1946–47 ; these have been thoroughly studied by the authors. All four strains caused scrotal reactions in 40–50 per cent. of male guineapigs ; other strains used in comparative tests gave the following percentages of scrotal reactions : *R. prowazeki*, 28 : *R. mooseri*, 94 : South African tick-bite fever, 87 ; North-Queensland tick typhus, 70 : and Rocky Mountain spotted fever, 63.

Cross-vaccination tests showed that a Siberian strain protected guineapigs against epidemic typhus and *vice versa*, but gave only slight protection against murine typhus and no protection against the Queensland and South-African tick-borne typhus fevers.

Guineapigs convalescent from infection with any of the four strains were immune to *R. prowazeki* and showed considerable immunity against *R. mooseri*. Guineapigs convalescent from *R. mooseri* infection were solidly immune against all four strains. No cross immunity between any of the strains and Rocky Mountain spotted fever could be demonstrated.

Complement-fixation and cross-immunity tests failed to distinguish between the four strains and the Breinl strain of epidemic typhus.

The authors state that if the Siberian strains were really the agents of Siberian tick typhus, the question arises whether *R. prowazeki* can be maintained in nature as a rodent-tick-rodent cycle. *John W. D. Megaw*

BELL, J. A., BECK, M. D. & HUEBNER, R. J. **Epidemiologic Studies of Q Fever in Southern California.** *J. Amer. Med. Ass.* 1950, Mar. 25, v. 142, No. 12, 868–72. [Refs. in footnotes.]

Representatives of various population groups in South California were examined by the complement-fixation test for Q fever : there were 488 positive reactions among 9,804 persons tested.

The percentage of positive reactions among persons living within one-eighth of a mile from dairies was 7·7 against 4·0 to 4·3 for those living between one-eighth and three-quarters of a mile away.

The occupational figures are of special significance. In the table figures are given for persons employed in concerns dealing with cattle and their raw products : the first column shows the percentage of positive reactions among the persons who had intense contact with the cattle or their raw products, the second refers to those who had no very close contact.

Percentages of Positive Complement-Fixation Reactions.

Employment	Having Intense Contact	Not having Intense Contact
Meat-packing station (few calves or dairy cows handled)	6·0	2·1
Meat-packing station (many calves and dairy cows handled)	16·2	5·5
Creameries	13·7	5·1
Hide plants	30·0	14·3
Dairies	29·1	6·0

Among 1,701 persons who were in the habit of drinking raw milk the percentage of positives was 10·1 as compared with 4·2 among 6,862 persons who denied drinking raw milk.

In the group of persons living in the area but having no special association with cattle or their products the percentage of positive reactions ranged from 1·2 to 1·4.

The authors think it likely that more than 50,000 persons in the Los Angeles area have been infected with Q fever "during recent years", and that a considerable proportion of these infections have caused an acute illness with fever lasting two or more days. *John W. D. Megaw*

CALLOT, J., VERMEIL, C. & PUECH, J. Sur une souche de Q fever isolée à Strasbourg. [**Note on a Strain of Q Fever Rickettsia isolated at Strasbourg.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 1/2, 5–7.

The strain studied by the authors was isolated from the liver of a patient who had died of Q fever during an epidemic at a Strasbourg slaughter-house in 1948.

Details are given of the experimental transmission of infection from guineapig to guineapig by the bites of nymphal ticks (*Rhipicephalus sanguineus*) which had been infected in the larval stage by biting infected guineapigs.

The faeces of the infected ticks were found infective for guineapigs by intraperitoneal inoculation. The tick strain caused no scrotal reaction: in its early passages through guineapigs it caused a few deaths, less than 10 per cent.; in later passages there was no mortality. Ticks had played no part in transmission during the original epidemic. *John W. D. Megaw*

WEYER, F. Zur Übertragung des Q-Fiebers. [**The Transmission of Q Fever.**] *Zent. f. Bakt.* I. Abt. Orig. 1949, Sept. 23, v. 154, Nos. 6/7, Bericht pp. 165*–70*. [15 refs.]

The author has studied the transmission of *Rickettsia burneti* in ticks, human body lice, and mouse-fleas. The lice and fleas were successfully transmitted by the rectal, and the ticks by the coelomic, route, with suspensions of the spleen and lungs of infected mice.

Four out of six ticks (*Ornithodorus moubata*) became infected by biting infected persons: the only tick allowed to feed on an infected guineapig became infected, and so did both of the ticks allowed to feed on an infected mouse.

Infected ticks of the same species transmitted infection to one of three mice and to one of two guineapigs, by biting.

The coxal fluid of three out of five infected ticks was found infected, and so were the faeces of two out of four of the ticks.

Eight unsuccessful attempts were made to transmit infection to mice by the bites of infected mouse-fleas: this and other observations suggested that the virulence and infectivity of the rickettsiae became lessened by passage through fleas and increased by passage through ticks.

The author concludes that ticks play a special part in the epidemiology of the disease.

In the discussion of the paper W. KIKUTH mentioned an experience which suggested that one of his laboratory strains had suddenly become highly infective after a long series of transmissions in which ticks had not been employed. *John W. D. Megaw*

DENGUE AND ALLIED FEVERS

SCHLESINGER, R. W. **Propagation in Chick Embryos of the Hawaiian Strain of Dengue Virus. I. Sustained Serial Passage in Eggs after One Hundred and One Intracerebral Passages in Mice.** *Amer. J. Hyg.* 1950, Mar., v. 51, No. 2, 248–54. [11 refs.]

Fertile eggs were inoculated with suspensions of mouse brains infected with material obtained from mice of the 100th brain passage.

The harvested embryos were tested by inoculating mice weighing 8 to 10 gm. Successive egg transfers have been maintained so far through 48 weekly passages, and the virus has remained virulent for mice. Cotton rats and hamsters were not found susceptible.

Antigens prepared from baby mice inoculated with chick-embryo material of the 44th passage were found active in complement-fixation tests of dengue-immune sera obtained from *rhesus* monkeys inoculated with the original human Hawaii virus.

One of two persons inoculated with material of the 38th egg passage developed a low-grade continued fever on the 9th and 10th days and had a discrete macular rash; sera of both persons contained potent neutralizing antibodies, but no complement-fixing antigen.

The author states that the previous reports by various workers of the propagation of dengue virus in hens' eggs have failed to furnish adequate evidence that the agent carried in the eggs was dengue virus: he does not think it possible to obtain egg cultures without preliminary adaptation by repeated passage through mice. *John W. D. Megaw*

SMITHBURN, K. C., MAHAFFY, A. F., HADDOW, A. J., KITCHEN, S. F. & SMITH, J. F. **Rift Valley Fever. Accidental Infections among Laboratory Workers.** *J. Immunology.* 1949, June, v. 62, No. 2, 213–27, 4 figs.

See *Bulletin of Hygiene*, 1950, v. 25, 110.

RABIES

CALVÓ FONSECA, R. Contribución al estudio de la rabia en Cuba. La enzootia rábica en la Provincia de Pinar del Río durante los años 1942–1948. [**Rabies in Cuba. Enzootic in Pinar del Rio in 1942–1948.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, Sept.–Oct., v. 5, Nos. 9/10, 130–33.

Rabies appears to be on the increase in the Province of Pinar del Rio. During the 7-year period, 1942–48, there have been 5,209 dogs immunized and 14,811 stray dogs destroyed. The percentage found positive among animals retained for observation has also increased. Thus, in the five years 1944–48, the numbers kept for observation were 130, 148, 167, 160 and 240 and those found positive were 3 (2·3 per cent.), 3 (2·02), 10 (5·98), 8 (5) and 18 (7·5); altogether, 1,253 have been under observation and 65 (5·18) were found to be positive. Of the 15 Municipalities in the Province, from 7 none has been reported during the whole 7 years; in the other 8 the percentage positive has ranged between 2·06 in Cabañas and 24·2 in San Juan y Martinez; Artemisia had 7·2, Mariel 5·6 (but only 53 were under observation here), Pinar del Río 4·16 and Guanajay 3·3. The increase in San Juan y Martinez has been remarkable; in 1945 three were retained for observation but none proved to be positive; in 1946 five out of 10 were positive; in 1947 seven out of 19 and in 1948 fifteen out of 71. The increase is ascribed to the importation of ferrets (*Mungus birmanicus*) which have disseminated the virus to dogs and other [not specified] animals. These ferrets were introduced to combat rats which were damaging the trade of those engaged in cane-cutting. Control measures suggested include mass immunization of dogs and destruction of stray dogs and better means for observation and more rapid diagnosis. *H. Harold Scott*

CAMPILLO, C. Aislamiento del virus en tres casos de rabia humana. Reporte clinico. [**Isolation of Rabies Virus from Three Human Cases. Clinical Report.**] *Medicina.* Mexico. 1950, Jan. 10, v. 30, No. 595, 1–6. English summary.

Rabies is endemic in the Mexican Republic. During the 10 years ending 1947 there has been an average of 41 cases annually and in 1949 ORTÍZ MARIOTTE reported that the curve of incidence tended to rise in spite of the use of the vaccine by Semple's method. The author reports details of three cases, two adults, men aged 52 and 57, and a boy aged 6 years; all had been bitten by rabid dogs in the street and all died after the disease had run a typical course. By inoculation of animals, mice and cuis [small rodents of the hamster type] with brain tissue the virus was conveyed to them. In one case the saliva

was proved to be infectious in the following way. The saliva was obtained by suction with a pipette, then diluted with normal saline, centrifuged to throw down the grosser impurities and the supernatant was treated with crystallized sodium penicillin, 500 units per cc., and used for inoculation, intracerebrally and subcutaneously. The results in mice and cuis were negative but a rabbit developed the disease 24 days later and died 24 hours after paralysis had set in. It is noteworthy that the saliva was infective subcutaneously for the rabbit, but not for mice inoculated intracerebrally. *H. Harold Scott*

REMLINGER, P. & BAILLY, J. Le choc dit phéniqué est un choc lapinique. [**The So-called " Phenol Shock " is a " Rabbit-Tissue " Shock.**] *Ann. Inst. Pasteur.* 1950, Apr., v. 78, No. 4, 544–5.

BAILLY, J. Action du venin de scorpion sur le virus rabique. [**Action of Scorpion Venom on Rabies Virus.**] *Arch. Inst. Pasteur d'Algérie.* 1949, Dec., v. 27, No. 4, 310–11.

Continuing the study, with REMLINGER, of the action of various substances on rabies virus [this *Bulletin*, 1947, v. 44, 1030] the author has turned his attention to scorpion venom. Scorpions are easy to find in Tangier, a polypeptidase has been demonstrated in their venom and the common local species *Heterometrus maurus* is that showing least toxic effect in experimental rats.

Sterile emulsions in distilled water (*p*H8) were prepared from 30 crushed and dried telsons of this scorpion. After a few hours at 6°C., filtrates of these emulsions were mixed with a 1/20 filtered emulsion of cord tissue from a rabbit which had died of rabies (fixed virus).

Different mixtures of venom extract and the virus emulsion were kept in contact for 24 hours at 6°C. and 1/20 cc. of each mixture was then inoculated subdurally into a white rat : control rats received the virus in an equal volume of water only. A table shows that rats inoculated with the virus and venom extract mixtures were protected, while the control rats receiving untreated virus died of rabies.

The author concludes that the venom of the scorpion *H. maurus* should therefore be added to the list of various proteolytic agents shown to be lytic for rabies virus. *H. J. O'D. Burke-Gaffney*

PLAGUE

YEH, J. & DAVIS, D. E. **Seasonal Changes in Abundance of Fleas on Rats at Baltimore, Md.** *Pub. Health Rep.* Wash. 1950, Mar. 10, v. 65, No. 10, 337–42, 2 figs.

Fleas were collected from rats trapped in a group of poultry houses in Baltimore over a period of 14 months during which the rat population remained relatively constant.

The number of rats trapped was 966, all were *Rattus norvegicus* ; 3,520 fleas were collected ; 45 per cent. of these were *Xenopsylla cheopis* ; 44·1 per cent. were *Nosopsyllus fasciatus* and the rest were *Leptopsylla segnis*.

The percentage of rats infected with *X. cheopis* was lowest (2·1) during the months of March and April : it rose to 55·7 during the hot and moist period June 25 to August 19 ; declined to 25·6 during the somewhat cooler and drier weather of August 20 to September 30 ; and rose to a second peak of 64·7 in the cool dry period November 12 to December 16.

N. fasciatus was found on 50 to 59 per cent. of the rats during the period December 17 to June 24, and in only 5·2 per cent. in the period August 20 to September 30. *John W. D. Megaw*

CHRONICLE WORLD HEALTH ORGANIZATION. 1949, Dec., v. 3, No. 12, 269–74, 1 fig. **Active Measures against Plague.**

This article summarizes the conclusions reached by the W.H.O. Expert Committee on Plague during its first session in September, 1949. By the use of the new rodenticides, insecticides and chemotherapeutic agents, it is now possible to eradicate plague from limited foci where the plague reservoirs are domestic rodents; the wide-scale eradication of the infection, however, is still impracticable in wild rodents. Delimitation of the endemic area must be the first stage of any campaign. Such detailed information is available in parts of the Bombay province of India, but is missing in other parts of the world, *e.g.* tropical Africa; it was decided to send a preliminary questionary to the health authorities in such areas. It was proposed to establish a demonstration team to work in collaboration with local groups, first in Bombay province, then perhaps in the Azores or Madagascar, Morocco, Belgian Congo or China. For the disinfestation of rice, Cyanogas is efficacious and relatively safe; liquid hydrocyanic acid and methyl bromide are too dangerous for general use; acrylon may prove the best agent. Streptomycin seems to be the best drug for use in the treatment of pneumonic plague; for prophylaxis of this form of the disease, the dosage recommended is 3 gm. of sulphadiazine or sulphamerazine daily for at least five days. Streptomycin cannot be used prophylactically because of its rapid excretion from the body. *P. C. C. Garnham*

SCHEIN, M. W. **Field Test of the Efficiency of the Rodenticide Compound W.A.R.F. 42.** *Pub. Health Rep.* Wash. 1950, Mar. 17, v. 65, No. 11, 368–72, 1 chart.

The author describes a practical trial of the anticoagulant Compound W.A.R.F. 42, which has been found in the laboratory to be harmless to handle and use, while being extremely effective as a rodenticide when time is allowed for its cumulative action. A period of four to six days at a concentration of 1·0 mgm. for each gramme of bait gives a good kill.

No pre-baiting is needed if the bait is known to be acceptable to the rats. The bait used was finely ground maize with which the poison was mixed by hand: it was distributed in open cigar boxes in suitable places in six blocks of slum houses; similar blocks were used as controls.

Details are given of the amount of bait consumed on each day, of the number of dead rats found, and of the estimated reduction in the number of rats in each block. Out of 62 bait stations, six were not used by the rats and 19 others were not used till after the third day.

The average reduction in the number of rats was 84·5 per cent.; in the control blocks there was no significant change in the rat population. The greatest mortality occurred on the fifth and sixth days after baiting started. Three months after the final survey the rat population had increased by 88 per cent.; no significant change was observed in the control block.

No mention is made of the risk to domestic animals.

John W. D. Megaw

CHOLERA

WHITE, F. B. **A Note on the Globular Forms of** *Vibrio cholerae*. *J. General Microbiol.* 1950, Jan., v. 4, No. 1, 36–7, 2 figs. on pl.

When about a quarter of the growth of a 24-hour agar culture of *Vibrio cholerae* is added to a solution of penicillin (25–100 u./ml.), globular forms of the organisms appear in large quantities: the spheres may be up to 8–10 μ in diameter: they are flagellated and motile and remain so in the penicillin-vibrio mixtures for several days at 10°C. On prolonged incubation, the spheres may attain 12 μ in diameter: they lose motility and staining properties, become "vacuolated" and may bulge from the periphery: the author believes that the stainable flagella are in fact the cause of locomotion.

By means of the author's differential congo-red methylene-blue method [see *Bulletin of Hygiene*, 1948, v. 23, 55] the larger spheres usually stain blue and the others take the methylene-blue only when they are dead. When nucleic acid is removed by extraction of the spheres, granules are revealed by methylene-blue staining: these may represent the unit organisms in the mass growth.

The penicillin is not lethal nor particularly harmful and apparently simply suppresses directional growth and the usual form of division: there is no increase in the number of viable individuals.

The serological properties of the spheres are similar to those of the parent culture.

Under optimum conditions "starfish-like" forms occur, many of which are motile. When stained the broader part of the branches is revealed as multiple chains of nuclear elements: the finer branches are formed of simple vibrios, from which the culture may regenerate in its original form, or, on fresh penicillin-agar, in the spherical form.

It is suggested that the globular form may be a step towards the vesicular forms occurring in the streptobacilli: it is also suggested that the development of multinuclearity may have been a stage in the evolution of the multinucleated and branched species of bacteria.

The forms described are illustrated in two photomicrographs.

H. J. O'D. Burke-Gaffney

WINDSOR, E. **The Absence of α-Aminoadipic Acid in Cholera Vibrio.** *J. Biol. Chem.* 1950, Feb., v. 182, No. 2, 699–700.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SINGH, B. N. **A Culture Method for growing Small Free-Living Amoebae for the Study of their Nuclear Division.** *Nature.* 1950, Jan. 14, 65–6.

A description is given of a method used for studying nuclear division in free-living amoebae, grown in "pure mixed" culture, with a single species of bacteria (*Aerobacter*) as food, on non-nutrient agar medium (1·5 per cent. agar in 0·5 per cent. NaCl at *p*H 6·6–7·0).

Preparations for cytological studies were made as follows. A drop or two of hot melted agar (as above) are placed on a slide and covered by a ⅞ in. coverslip. After solidification of the agar the coverslip is removed from the slide and excess of agar is trimmed off, leaving a square film. Then one or two loopfuls of a culture of *Aerobacter* sp. in 0·5 per cent. NaCl is smeared on the surface and a rich culture of the amoebae is inoculated on the agar film.

The slides are subsequently kept in moist chambers in Petri dishes and incubated at 20–21°C. overnight. Next morning films are fixed at hourly intervals in suitable fixatives. After fixation they are put into 90 per cent. ethanol for 24 hours, then carried through decreasing concentrations of ethanol (a few minutes in each) and finally placed in distilled water. At this stage the agar film is gently removed by shaking the slide. Apparently the amoebae sink through the agar and adhere to the slide, so that after removal of the film the final preparation contains a large proportion of amoebae. These are then stained and permanent preparations are obtained in the usual way. The preparation contains numerous amoebae in a confined area and reveals many individuals in various stages of division.

[It is conceivable that, by using appropriate solid media and at a temperature of 37°C., this method might be adapted for the study of division in human intestinal amoebae.] *C. A. Hoare*

PHILLIPS, B. R. **Cultivation of** *Endamoeba histolytica* **with** *Trypanosoma cruzi*. *Science*. 1950, Jan. 6, 8–9. [13 refs.]

The cultivation of *Entamoeba histolytica* in the absence of bacteria would be of utmost importance for the study of its physiology and pathogenesis, as well as for sero-diagnostic tests. However, up to the present all attempts to produce lasting bacteria-free cultures have failed, though "pure mixed" cultures with a single species of bacteria have already been obtained. In the present paper the author provides an indirect approach to the solution of this problem, by cultivating *E. histolytica* with living or killed *Trypanosoma cruzi*. They were grown in test tubes and in microtubes (4×50 mm.), in a medium consisting of thioglycollate preparation, horse serum, and an overlay of NIH diaphasic blood-agar (JOHNSON, *J. Parasit.*, 1947, v. 33, 85), containing a rich culture of the trypanosome. Cultures of the amoeba, grown in a liquid thioglycollate-serum medium in the presence of penicillin-inhibited streptobacillus, were inoculated into test tubes with the preceding medium (already containing *T. cruzi*). The amoeba-trypanosome cultures were maintained in 15 passages by subinoculation at intervals of 48 hours, penicillin being added to the first four subcultures to ensure elimination of the streptobacillus.

Microcultures of *E. histolytica* were started from single washed amoebae, which were transferred by micro-isolation to microtubes containing the above medium with trypanosomes. In these cultures active amoebae were seen for ten days.

Growth of *E. histolytica* with dead *T. cruzi* succeeded only in microcultures. Before the medium was introduced into microtubes the trypanosomes in the fluid constituent were killed by exposure to a temperature of 46°C. for 1 hour 15 minutes in a water bath. The microtube was then inoculated with a single amoeba. In these cultures the amoebae reproduced as well as in mixed cultures with living trypanosomes.

Since *T. cruzi* can be inactivated at temperatures slightly higher than 37°C., the heating has no marked deleterious effect on proteins and enzyme systems, on account of which such cultures can be employed for the study of growth factors required by *E. histolytica*. *C. A. Hoare*

JONES, Myrna F. & NEWTON, W. L. **The Survival of Cysts of** *Endamoeba histolytica* **in Water at Temperatures between 45°C. and 55°C.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 53–8, 1 fig.

In view of the conflicting data regarding the effect of high temperatures on the cysts of *Entamoeba histolytica*, the authors have undertaken an investigation

of this question, using cultures containing cysts which were concentrated and washed by centrifugation, and then stored at 5°C. For the tests, centrifuge tubes containing distilled water were heated to temperatures between 45°C. and 54·5°C. in a thermostatically controlled water bath. The cysts (2,000 per ml.) were put into the tube for a desired period of time, after which a sample was removed and added to a small amount of distilled water at 5–10°C. for rapid cooling, and part of the suspension was inoculated in modified Boeck-Drbohlav medium with the original bacterial flora. Failure to grow in this culture after three days (and in subculture, if negative) was used as a criterion of death of the cysts. The cysts exposed to various temperatures were destroyed after the following periods of time : at 45°C. after more than 2 hours, at 46–47°C. within 1 hour, at 48°C. in 30 minutes, at 49–50°C. in 5 minutes, at 52–54·5°C. within 1 minute. *C. A. Hoare*

VELAT, C. A., WEINSTEIN, P. P. & OTTO, G. F. **A Stain for the Rapid Differentiation of the Trophozoites of the Intestinal Amoebae in Fresh, Wet Preparations.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 43–51, 6 figs. on pl.

The authors describe a new rapid method of staining human intestinal amoebae, suitable for diagnostic purposes. Trophozoites of the amoebae, from faeces or cultures, stain within a few minutes, revealing the same structural details as in permanent haematoxylin preparations.

The stain is made as follows : (1) A 2·5 per cent. solution of crystal violet is prepared by dissolving the stain in *warm* distilled water. (2) A 1 per cent. solution of haematoxylin is prepared by adding the powder to slowly boiling distilled water. (3) 0·4 cc. of triethanolamine is added to 100 cc. of the boiling haematoxylin solution, the mixture is boiled for another 2–3 minutes, and is then cooled to 50°C. (4) The warm haematoxylin-triethanolamine solution is slowly added to 20 cc. of the crystal violet solution, and the mixture is stirred, with the result that a precipitate is formed. (5) This precipitate is separated by filtration through medium grade filter paper, the accumulated filtrate being poured back into the filtering stain four or five times, after which the final filtrate is discarded. (6) With 10 cc. portions of distilled water (up to a total of 50 cc.) the precipitate adhering to the filter paper is washed down to the bottom of the cone. (7) The precipitate is left in the funnel to dry, after which the stain is removed from the filter paper and stored in a dry stoppered container, in which it remains stable indefinitely. (8) The dried stain is dissolved in a buffered solution, prepared by combining (*a*) acetic acid solution (16·82 cc. glacial acetic acid brought up to 1 litre with distilled water) and (*b*) sodium acetate solution (19·72 gm. of the salt dissolved in distilled water to make 1 litre). The best staining results are produced with solutions at *p*H 4·5 to 5·5, the required reaction being obtained by the following combinations of buffered solutions :—

*p*H	*a* (*cc.*)	*b* (*cc.*)
4·6	102	98
4·8	80	120
5·2	42	158
5·4	29	171

(9) The dried stain is made up as a 0·05 per cent. solution in the buffer at the desired *p*H, in which it dissolves within 2–3 weeks, after which the solution is filtered and is ready for use.

This solution stains the trophozoites of the intestinal amoebae but not their cysts. A small amount of faeces or a drop of culture containing the parasites

is mixed with one or two drops of the stain on a clean slide, after which a coverslip is applied and the preparation can be examined as a wet mount in the usual way. At *p*H 4·6–4·8 staining is completed in 3–5 minutes, and at *p*H 5·2–5·4 in 5–15 minutes. In the latter range the preparation can be kept without deterioration of the organisms for 72 hours, if the coverslip is sealed with a melted paraffin-vaseline mixture.

The nuclear structures in the amoebae stain purple-black, while the cytoplasm assumes a light purple colour, and the food particles are also recognizable. This stain can also be used for the differentiation of intestinal flagellates, *Blastocystis* and histological elements, such as leucocytes, macrophages and epithelial cells. *C. A. Hoare*

LIMBOS, P. Abcès du lobe gauche du foie. [**Abscess of the Left Lobe of the Liver.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Mar. 31, v. 30, No. 1, 119–20.

The following is a translation of the author's summary :—

An amoebic abscess of the left lobe of the liver, which developed without fever or neutrophilia and was mistaken for a bilharzial cirrhosis.

H. J. O'D. Burke-Gaffney

BOOKLESS, A. S. **Thoracic Amoebiasis.** *J. Roy. Army Med. Corps.* 1950, Feb., v. 94, No. 2, 52–60, 6 figs. [13 refs.]

There was evidence of various changes present in the right chests in 10 of 26 patients suffering from [suspected] hepatic amoebiasis in hospitals in the Middle East. These changes took the form of lobar consolidation (four cases), bronchopneumonia (three cases), bronchitis (two cases), dry pleurisy (two cases), or pleural effusion (one case), one or more of these occurring in a single patient. In only two patients was the diagnosis sustained by the recognition of an *Entamoeba histolytica* infection in the gut ; it rested in the other cases on the rapid clinical response to emetine treatment. In none of the ten cases was there a frank lung abscess, and the associated liver lesions were considered to be due to amoebic hepatitis rather than to amoebic liver abscess formation. The lung manifestations were often acute and they often preceded, rather than followed, those arising in the liver region. The thoracic changes were not thought invariably to be attributable to the entry of amoebae into the chest, and in no case was amoebae recovered from sputum. [It therefore appears somewhat inappropriate to refer to the condition as " Thoracic *amoebiasis* ".]

A. R. D. Adams

CARTER, M. G. & KORONES, S. B. **Amebic Pericarditis. Review of the Literature and Report of a Case.** *New England J. of Med.* 1950, Mar. 16, v. 242, No. 11, 390–94, 4 figs. [17 refs.]

A case in a Hindu from Goa, who had lived for three years in the United States.

DO PRADO, F. C. Terapêutica da amebíase. [**Treatment of Amoebiasis.**] *Rev. Brasileira Med.* Rio de Janeiro. 1950, Jan., v. 7, No. 1, 13–16. English summary.

In most cases the treatment of acute amoebic dysentery is satisfactory, from one point of view, namely, disappearance of acute symptoms, but if treatment is stopped early there is the danger that the acute may gradually and surreptitiously be transformed into a chronic amoebiasis. If this is to be avoided the treatment should be more prolonged and not stopped because the acute

symptoms have subsided. The author's scheme of treatment is as follows: For acute amoebic dysentery, emetine in a maximum daily dosage of 1 mgm. per kilo body-weight for ten days. This is, however, better for extra-intestinal localization of the *Entamoeba*. For others, entero-vioform, three or four tablets of 0·25 gm. daily, aided in severe cases by intravenous glucose injections and vitamins B_1 and C, because these increase tolerance to entero-vioform.

For chronic disease he recommends the following scheme. The table here given saves a long description. The course is one of four months, in each of which there are alternating weeks of treatment by iodine compounds and by arsenicals, the fourth week of each month being a rest-week.

	1st month	2nd month	3rd month	4th month
1st week ...	Iodine	Arsenical	Iodine	Arsenical
2nd ,, ...	Arsenical	Iodine	Arsenical	Iodine
3rd ,, ...	Iodine	Arsenical	Iodine	Arsenical
4th ,, ...	Rest	Rest	Rest	Rest

The iodine compounds include entero-vioform, yatren (iodohydroxyquinoleine sulphonate of sodium) two pills each of 0·25 gm., two or three times a day; the arsenicals used were carbarsone, a capsule of 0·25 gm., twice daily, and entero-stovarsol in similar dosage. All these are to be taken after food.

If there are bacillary complications, auxiliaries such as sulphonamide drugs, bacteriophages, antibiotics and vaccines are helpful; also liver extracts parenterally, careful dieting and local rectal applications of rivanol 0·1 per cent., or yatren 2 per cent., gentian violet 1 per cent., collargol 5 per cent.

The author has treated in this way about 400 patients in the past five years, but selects 140 from his private practice. Seventy per cent. of these have been clinically cured, all the symptoms have cleared up and *Entamoeba* can no longer be found in the faeces although they have been followed up for three years. In 17·1 per cent. the cure has been incomplete; no entamoebae are found but indefinite intestinal disturbances continue and in the remaining 12·9 per cent., though no entamoebae can be found, the symptoms of chronic colitis persist. [See this *Bulletin*, 1949, v. 46, 940, where the same series of cases seems to be referred to.] *H. Harold Scott*

BASNUEVO, J. G. & GUTIÉRREZ ESTARLI, E. Cloroquina y absceso hepatico amibiano. [**Chloroquine and Amoebic Liver Abscess.**] *Rev. Kuba Med. Trop. y Parasit.* 1949, Sept.–Oct., v. 5, Nos. 9/10, 133–5. [12 refs.]

The English summary appended to the paper is as follows:—

"Chloroquine administered by mouth seems to act specifically in amebic liver abscess.

"Administration of emetine to these cases is unnecessary.

"In intestinal amoebiasis one must still depend upon derivatives of iodo-hydroxyquinoline or in arsenical compounds.

"Chloroquine was administered by mouth in accordance to the dosage as follows:

"Chloroquine, 0·01 Gram (sal) per pound of weight up to 100 pounds, daily, for 3 days.

"After that 0·01 Gram (sal) per pound of weight up to 50 pounds, daily, for 24 days.

" If the patient weighs more than 100 pounds we do not give a dose higher than 1 Gram per day, for three days, and 0·50 Gram per day, for 24 consecutive days.

" We have instilled 0·25 Gram of Chloroquine dissolved in 10 cc. of distilled water in the abscess cavity locally."

ARMSTRONG, T. G., MAROT, J. T. & ELSDON-DEW, R. **Studies in Amoebiasis. The Effect of Anti-Bacterial Drugs.** *South African Med. J.* 1950, Feb. 25, v. 24, No. 8, 121–4. [10 refs.]

The synergic effect of anti-bacterial drugs with specific anti-amoebic treatment has already been observed at Durban [this *Bulletin*, 1949, v. 46, 831]. The therapeutic activity of penicillin and sulphasuxidine, at first given together and later given alone, in each instance without specific anti-amoebic treatment, has been studied in acute cases of amoebic dysentery occurring there. Although either drug alone proved effective in the treatment of acute amoebiasis in a high percentage of cases, a combination of penicillin and sulphasuxidine given concurrently was established to be even more effective. Control cases received no treatment, or a placebo. The authors conclude that anti-bacterial drugs in the absence of more specific treatment can substantially modify the course of acute amoebiasis as seen in Africans in Durban ; and they attribute this action to changes in the associated bacterial flora which cease to favour the growth of the amoebae. They warn against indiscriminate use of these drugs in suspected amoebiasis, as two-thirds of all cases of amoebiasis are suppressed by them and the diagnosis may thus be masked ; and indeed they deprecate their use in non-ulcerative forms of this infection.

[The peculiarly fulminating and often fatal type of amoebic dysentery described as occurring among Africans in Durban (see this *Bulletin*, 1947, v. 44, 310), and its remarkable response to treatment solely with the anti-bacterial drugs, leads the reviewer to wonder whether these are indeed true cases of fulminating amoebic dysentery, or whether they are more correctly cases of acute bacillary colitis superimposed on a pre-existing amoebic parasitization, the former being the causative factor in the illness.]

A. R. D. Adams

DE PAULA, A. Necessidade e vantagem da associação do tratamento parespecífico na amebíase crónica. Ensaios com a aureomicina. [**Necessity and Advantage of the Association of Para-Specific Treatment in Chronic Amoebiasis. Experiments with Aureomycin.**] *Rev. Brasileira Med.* Rio de Janeiro. 1950, Feb., v. 7, No. 2, 100–102. English summary.

The author records the cases of eight patients with dysenteric symptoms who, in spite of temporary improvement under the usual modes of treatment, were not cured, but tended to relapse from time to time or were intolerant of the usual specific drugs. In six of these great benefit was obtained from sulphasuxidine or antibiotics, notably streptomycin in doses of 1 gm. daily for 15 days (in one case for 20 days). Two others, a man of 28 years and a student of 16 years, were given aureomycin, 250 mgm. every four hours, or a total of 1·5 gm. in the day. Subsequent examination revealed no entamoebae in the stools and the clinical symptoms had cleared up. In the older patient this is said to have occurred after eight days ; in the second case the interval is not mentioned.

H. Harold Scott

RELAPSING FEVER AND OTHER SPIROCHAETOSES

HEISCH, R. B. **Studies in East African Relapsing Fever.** *East African Med. J.* 1950, Jan., v. 27, No. 1, 1–58. [Numerous refs.]

A comprehensive account of relapsing fever in East Africa, chiefly the tick-borne disease, but also dealing with work on the Kenya epidemic of the louse-borne variety. The spirochaetes of the former have at different times been designated *Spirochaeta duttoni*, *S. kochi* and *S. rossi*, but since they are all similar and in nature transmitted by the same vector, *Ornithodorus moubata*, they are all included under the term *Spirochaeta duttoni*. The main centres of this disease in Kenya are near Meru, and in the Kikuyu, Nyanza and Taita Native Reserves. In Uganda the main centres are Ankole in the Western Province and Masaka in the Baganda Province. In Tanganyika, Mwanza, the Musoma Districts of the Lake Province, Biharamulo in the Western Province, and the old endemic centre of Tabora. In addition an epidemic of louse-borne relapsing fever, due to *S. recurrentis*, introduced from Arabia, occurred near Mombasa in 1945.

A comparison is made between various East African strains of *S. duttoni*, by means of cross-immunity tests, agglutination, behaviour in arthropods, and the course of the disease in animals. There was an absence of cross-immunity between most of the strains examined, even when they were from the same locality, but in many cases the infections in immunized or hyper-immunized animals reinoculated with other strains, were of short duration, which may indicate a relationship between them. In contrast to heterologous strains, there was always cross-immunity between homologous strains.

Cross-immunity reactions between known strains of *S. duttoni* remained constant over long periods and were not affected by passage through ticks and lice. No immunological differences were found between the spirochaetes of the first attack and first relapse, and if such differences exist, it is suggested that they might be demonstrated by some complement fixation test.

Spirochaeta duttoni was found to be capable of infecting and undergoing cyclic development in *Ornithodorus savignyi*, *Pediculus corporis* and *Pedicinus longiceps* in addition to its usual vector *O. moubata*. This lack of specificity is contrary to what is seen in American tick-borne strains. Four out of 18 batches of *O. moubata* collected in different parts of East Africa, produced infection when fed on laboratory animals. A batch of 300 *O. savignyi* from British Somaliland was non-infective, while two out of four batches of *O. moubata* from the same locality proved infective, when fed on animals. This suggests that the latter species is the main natural vector, although *O. savignyi* can be infected with *S. duttoni* in the laboratory.

When bedbugs, *Cimex hemipterus*, were fed on an infected animal, spirochaetes could be found in their contents up to the 12th or 13th day and infection was produced by the inoculation of the contents on the 12th day. The infection could not be transmitted by the bites of these bedbugs.

Several strains of *S. duttoni* in East Africa were found to be capable of infecting and undergoing metacyclic development under laboratory conditions and a provisional classification of tick-borne spirochaetes is suggested, based on their behaviour in lice, as follows :—

(*a*) Tick-borne spirochaetes unable to infect lice, such as certain strains of *S. duttoni* and *S. persica*.

(*b*) Tick-borne spirochaetes able to infect lice but without the development of metacyclic forms, as in certain strains of *S. hispanica*.

(*c*) Tick-borne spirochaetes able to infect lice with the development of metacyclic forms, as in the case of East African strains of *S. duttoni*, certain strains of *S. hispanica* and *S. turicatae*.

Four out of seven batches of lice collected at Kisumu from patients suffering from relapsing fever were found to be infected with *S. duttoni*, yet a batch of "clean" lice fed on another patient with spirochaetes in his blood, did not become infected. The occurrence of natural infections in lice suggests that these may be alternate vectors of the disease. Three strains of *S. duttoni* were found capable of infecting and undergoing metacyclic development in monkey lice, *Pedicinus longiceps*.

Various species of wild rodents caught in both infected and uninfected huts were examined for spirochaetes with uniformly negative results. The 241 rodents examined comprised *Rattus rattus kijabius* Allen, *R. rattus frugivorus* Rafinesque, *R. coucha*, and *Arvicanthis abyssinicus nubilans* Wroughton. Experimentally, the black rat, *R. rattus kijabius* was found to be very susceptible, and only 3 survived out of 19 animals infected with various strains of *S. duttoni*. Spirochaetes were found in pygmy gerbils, *Dipodillus* sp., from near Lake Naivasha, but they were only mildly pathogenic in man.

Rats placed in an African hut infested with *O. moubata* did not become infected and the ticks were not seen to feed on the animals. In the case of *O. savignyi* it was found that although rats and mice could protect themselves against the adult ticks, they were unable to avoid the nymphs.

The author accidentally infected himself with one of the laboratory strains and suffered four relapses in addition to the first attack. Large doses of penicillin cut short the attacks but did not prevent relapses. A detailed account is given of the clinical symptoms of the attack.

White rats and mice infected with *S. duttoni* were treated with large doses of penicillin. Although spirochaetes disappeared from the blood, neither relapses nor brain infections were prevented.

In experiments with pregnant rats, only one example of congenital transmission was obtained. In this case the brain of a newly-born rat produced infection when inoculated into a normal animal. *E. Hindle*

PFISTER, R. Recherche des spirochétolysines dans le sang de cobayes, guéris (ou prémunis) de fièvre récurrente à *Spirochaeta* (=*Borrelia*) *hispanica*. [**A Study of the Spirochaetolysins in the Blood of Guineapigs, recovered from (or immunized against) Relapsing Fever due to** *Spirochaeta hispanica*.] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 11/12, 547–9.

The author has studied the lytic action of various dilutions of the sera of 15 guineapigs recovered from infections of *Spirochaeta hispanica* or suspensions of the same spirochaete. These sera came from guineapigs after periods ranging from 2 days to 11 months after the crisis of the attack. Mixtures were made *in vitro* and observed after two hours at 37°C. ; in addition slide preparations were also studied under dark ground illumination. The results were uniformly negative, and indicate that this method would be of no use in a study of the epidemiology of *S. hispanica* infection [see also this *Bulletin*, 1949, v. 46, 837]. *E. Hindle*

YAWS

AMPOFO, O. & FINDLAY, G. M. **Aureomycin in the Treatment of Yaws and Tropical Ulcer in Africa.** [Correspondence.] *Nature.* 1950, Mar. 11, 398–9.

The authors refer to the ubiquity of yaws and tropical ulcer in tropical African practice and comment on some of the disadvantages in the use of existing forms or parenteral therapy, especially where mass treatment among backward peoples is concerned.

In view of satisfactory results reported with the use of aureomycin in secondary syphilis and in relapsing fever, they gave this antibiotic orally to three African children with florid secondary yaws : the dose was six capsules of 250 mgm. each, daily for seven days. No changes were noted until the fifth day (up to when treponemata were present) when the lesions began to dry up : by the seventh day they had almost healed. The Kahn reactions remained positive for six weeks after treatment was stopped, although the children were well and had no relapse. Evidently, despite the rapid healing, no serological conversion occurred with the doses used.

The authors compare their results with their previous findings when penicillin was used in the treatment of yaws in the same area in Africa [this *Bulletin*, 1945, v. 42, 289 ; 1947, v. 44, 94] : aureomycin was slower in action than penicillin, but did not require intramuscular injections.

Four patients with foul tropical ulcers, teeming with spirochaetes and fusiform bacilli, were treated with aureomycin orally in doses of four to six capsules daily for four to seven days. The organisms had decreased within 24 hours and in 48 hours they were almost completely absent : by this time, the oedema had subsided and the ulcers in all four cases went on to complete healing. No local treatment for the ulcers was given other than lint soaked in distilled water. In these cases oral aureomycin seemed to be as rapid in action as intramuscular penicillin.

Optimum dosages are now being investigated. *H. J. O'D. Burke-Gaffney*

LEPROSY

VEGAS, M., CONVIT, J. & ESPIN, J. Estudios del reticulo en los distintos tipos de lepra. [**Study of Reticulum in the Different Types of Leprosy.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 264–76, 6 figs. [12 refs.] English summary.

The English summary appended to the paper is as follows :—

" We have studied reticulum formation in the three types of leprosy, macular simple, lepromatous and tuberculoid.

" Reticulum, according to our observations, is a constant element in the inflammatory reactions zones of the simple macular lesion, and in the lepromatous and tuberculoid granulomas.

" These reticular formations, very simple in the infiltrated zones of the simple macular, grow complex in the lepromatous type, and in the tuberculoid variety adopt the characteristic forms described by other authors in tuberculoid granulomas of other origins.

" The normal arrangement of the reticulum is a tridimensional network whose meshes give lodging to the cells which form the granuloma.

" Apparently these formations have an active role in the defensive progress of the organism against the leprosy bacillus."

DHARMENDRA. **Two Cases of Leprosy treated with Para-Amino-Salicylic Acid.** *Leprosy in India.* 1950, Jan., v. 22, No. 1, 4–5.

In view of the encouraging results obtained in the treatment of tuberculosis by PAS, the author tried this preparation in two cases of advanced, bacteriologically-proved lepromatous leprosy.

At first, each patient was given 20 gm. daily in divided doses every three hours, as a 20 per cent. solution of the acid. This dose produced signs of gastro-intestinal irritation, weakness and giddiness, so that after a week it was reduced to 15 gm. daily. This was well tolerated and was given for 30 weeks (with occasional interruptions because of reactions in one patient). The total doses were 3,500 gm. and 2,500 gm. respectively and the blood concentrations of PAS varied from 7 to 12 mgm. per cent.

Some clinical improvement was noted in each case, but no significant bacteriological improvement was seen.

The author suggests that PAS, being less toxic than sulphones, might perhaps be effectively combined with them : smaller doses of sulphones might then be needed and the tendency to produce anaemia minimized. It is noted, however, that the cost of PAS does not allow its use on a wide scale at present : by itself, PAS appears to be less effective than the sulphones in the treatment of leprosy.

H. J. O'D. Burke-Gaffney

LEVADITI, C., VAISMAN, A. & BARRAT, L. Virulence du bacille de Stefanski inoculé par voie cérébrale au rat et à la souris. [**Virulence of Stefansky's Bacillus inoculated intracerebrally in the Rat and Mouse.**] *C. R. Soc. Biol.* 1949, Nov., v. 143, Nos. 21/22, 1429–32.

HELMINTHIASIS

GILLET, J. Contribution à l'étude de la bilharziose urinaire au Congo Belge. [**A Note on** *Schistosoma haematobium* **in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 457–81. [43 refs.]

Gillet demonstrated the complete life-cycle of *Schistosoma haematobium* in *Physopsis africana* in the Bas-Fleuve Territory, Belgian Congo, where two foci of infection, Buku-Dundji and Mateba, were surveyed. Laboratory-bred snails were exposed to infection with miracidia from patients from Mateba. Miracidial attraction for *P. africana* was very evident ; but miracidia obtained from patients who had received several injections with pentamidine were slow-moving and failed to produce infection in the snails. Cercariae emerging from infected snails were put in contact with 21 white mice and 18 of these, examined 100+ days later were found to be infected. The principal sites of infection were the liver and mesenteric vessels. In one mouse two male worms were found in the lungs.

Attempts to infect 33 guineapigs failed. The snails *Pyrgophysa forskali* and *Lymnaea natalensis undussumae* proved refractory to infection with *S. haematobium.*

J. J. C. Buckley

SIVALINGAM, V. **Some Ceylon Fresh Water Snails and Human Schistosomes.** *Ceylon J. Med. Sci.* (Sect. D.) 1949, Dec., v. 6, Pt. 4, 184–5, 1 pl.

" Laboratory experiments to infect some of the common fresh water snails of Ceylon with *S. haematobium* and *S. mansoni* gave a negative result."

ERFAN, M. **Bilharzia Ova in the Sputum.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 1, 97–9, 1 fig.

Schistosoma ova are rarely found in the sputum, though cases have been described [PIJPER, this *Bulletin*, 1934, v. 31, 771–2]. The ova may however be found in high proportions in the lungs at autopsy [*ibid.*, 1938, v. 35, 665].

Professor Erfan reports the finding of *S. haematobium* ova in the sputum of a man of 40, complaining of cough, dyspnoea and pain in the left iliac fossa for 1½ years. Clinical evidence of emphysema and bronchitis was confirmed radiologically. There was a faint systolic murmur and the electrocardiogram showed an inverted T_3. A tender irregular mass was felt in the left iliac fossa, along the colon, and the spleen was enlarged.

No schistosome ova were found in the urine or faeces, but "bilharzial papillomata" were detected by sigmoidoscopic examination.

The sputum (24 hours specimen) was digested for an hour in an equal quantity of 4 per cent. KOH and centrifuged. On three separate occasions, *S. haematobium* ova were found microscopically in the deposit: this is illustrated in a photomicrograph.

The author points out that the importance of pulmonary schistosomiasis has only recently been recognized; but it is a frequent cause of chronic lung and heart disease in endemic areas. Demonstration of the ova in the sputum is the only absolute proof of pulmonary schistosomiasis in the living.

The author suggests that cases are missed by failure to examine the sputum by the simple digestion technique described: but he adds that the progress of the ova to the air passages may be arrested in the lung by the formation of a cellular reaction. [See also this *Bulletin*, 1949, v. 46, 57; 643.]

H. J. O'D. Burke-Gaffney

ROSS, O. A. & BUEDING, E. **Survival of** *Schistosoma mansoni in vitro.* *Proc. Soc. Exper. Biol. & Med.* 1950, Feb., v. 73, No. 2, 179–82. [10 refs.]

"1. A method is described for studying the survival of *S. mansoni in vitro.* 2. These parasites survived in serum for 14 to 18 days; in serum ultrafiltrate for 10 to 12 days. 3. In a chemically defined medium, the survival of the parasite did not exceed 18 hours. 4. Addition of an aqueous extract of beef muscle or of a purified fraction of protogen to the synthetic medium significantly increased the period of survival. 5. Under completely anaerobic conditions the schistosomes survived for 5 days."

LAGRANGE, E., SCHEECQMANS, G. & PROMEL, R. Sur diverses modalités d'infestation des *Planorbis glabratus* par *Bilharzia mansoni.* [**Different Degrees of Infection of** *Planorbis glabratus* **by** *Schistosoma mansoni.*] *C. R. Soc. Biol.* 1949, Dec., v. 143, Nos. 23/24, 1605–7.

In the course of passaging *S. mansoni* from *Planorbis glabratus* to mice, the authors observed in eight instances the sudden cessation of cercarial emission soon after it had begun, and that the snails lived a long time afterward. On another occasion snails which had a high percentage of infestation were isolated and their descendants only were used for passaging a strain of *S. mansoni* with the result that a consistently high infection rate was obtained in these even after the sixth passage.

They are of the opinion that there are biological strains of both *S. mansoni* and *P. glabratus* which are characterized by different degrees of susceptibility to infection by each other.

J. J. C. Buckley

SCHWETZ, J. *Planorbis choanomphalus* du lac Albert est transmetteur de *Schistosoma mansoni*. [*Schistosoma mansoni* **transmitted by** *Planorbis choanomphalus* (*Biomphalaria alexandrina* **var.** *choanomphala*) **from Lake Albert.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 491–4.

Schwetz exposed four mice to infection with bilharzia cercariae from naturally infected snails, *Planorbis choanomphalus* (=*Biomphalaria alexandrina* var. *choanomphala*) and 49 to 50 days later, *S. mansoni* eggs were found in the faeces of all four mice. On autopsy 63, 70, 77 and 74 days later, respectively, adult worms were found in the liver and mesentery. *J. J. C. Buckley*

COURTOIS, G. & WANSON, M. *Biomphalaria alexandrina choanomphala* v. Martens 1879 est un des hôtes intermédiaires de *Schistosoma mansoni* au Lac Albert. [*Planorbis choanomphalus* (*Biomphalaria alexandrina choanomphala*) **as an Intermediate Host of** *Schistosoma mansoni* **in Lake Albert.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 447–54. [17 refs.]

The rôle of *Planorbis choanomphalus* (*Biomphalaria alexandrina choanomphala*) as a vector of *Schistosoma mansoni* at Lake Albert was demonstrated experimentally. Three white mice were inoculated subcutaneously with 20 to 40 cercariae from naturally infected snails. Viable eggs of *S. mansoni* were found 90 days later in the faeces of one mouse, 107 days later in another and the third produced no eggs. After autopsy, small numbers of adult worms were recovered from the portal veins ; none was found in the liver, spleen or lungs.

J. J. C. Buckley

STANDEN, O. D. **The Concentration of Cercariae of** *Schistosoma mansoni* **for the Preparation of Cercarial Antigen.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Mar., v. 43, No. 5, 527–30, 1 fig.

" 1. A method of concentrating cercariae of *Schistosoma mansoni* is described. The negative geotropic, the positive phototropic, and thermotropic characteristics of the cercariae are utilized to concentrate them in the upper layers of water whilst snail faeces remain as sediment. Micro-organisms are removed as far as possible by dilution of their numbers.

" 2. Deposition of large numbers of cercariae upon a small filter paper is described. The need for high cercarial concentration and speed of filtration is emphasised as a means of preventing the death of the cercariae before completion of filtration and consequent leaching out of antigenic substances."

[For details of procedure this paper should be read in the original.]

MAYER, M., DI PRISCO, J. & DI PRISCO, Rosa. La especificidad de la bilharzina de vermes adultos de *Schistosoma mansoni* en intradermorreacciones en personas alérgicas. [**The Specificity of " Bilharzina " prepared from Adult** *Schistosoma mansoni* **in Intradermal Reactions in Allergic Persons.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Med.* 1949, Oct., v. 1, No. 2, 36–40.

The English summary appended to the paper is as follows :—

" It is safe to conclude that the Bilharzina of Mayer and Pifano, prepared from adult parasites of Schistosoma mansoni, is not affected in its positivity by any other allergy whatsoever, and that no false reactions are produced by some other allergens.

"The positive results from 1·100 I.D.R. [intradermal reactions]=29·8% obtained by us in the Department of Allergy in Caracas correspond to the average percentage of the Bilharzian infections in this city.

"The factors cited in the text are very probably the cause of the high percentage of pseudoreactions referred to by Bozicevich and Hoyem."

VOGEL, H. & MINNING, W. Weitere Beobachtungen über die Cercarienhüllenreaktion, eine Seropräzipitation mit lebenden *Bilharzia*-Cercarien. [**Further Observations on the** *Cercarienhüllenreaktion* [**Membrane Formation**], **a Sero-Precipitation with Living Schistosome Cercariae.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Dec., v. 1, No. 3, 378–86. [11 refs.]

This is a continuation of the authors' previous paper [this *Bulletin*, 1949, v. 46, 1154] in which they describe the formation of a close-fitting transparent membrane round living schistosome cercariae when these are placed in the sera of men or animals who have recently suffered from schistosomiasis. This phenomenon they have named the "*Cercarienhüllenreaktion* (CHR), and they distinguish it from the loose precipitate which occurs round similar cercariae when immersed in human sera, or in a wide variety of animal sera, regardless of any previous history of schistosome infection.

In the present paper, the authors give details concerning the reactions occurring in three active cases of human schistosomiasis, in all of which the CHR proved positive before treatment. Case I was still positive five months after successful treatment for *S. mansoni*, but was negative 21 months after treatment. Case 2 gave a positive CHR at a time when *S. haematobium* ova were still present in the urine. A year after treatment no eggs were found and the CHR was negative. Case 3 was treated for *S. mansoni* infection and eggs disappeared from the faeces a month later ; three months after the disappearance of ova the CHR, which was previously positive, became negative. As regards the practical application of the CHR to early diagnosis, the authors have no data of human cases, but in two rhesus monkeys, in which ova appeared in the faeces 48 days after exposure to infection with *S. mansoni* cercariae, the reaction when tested at weekly intervals remained negative until the 33rd day, but became positive, and remained so, from the 40th day onwards.

The authors deal with the specificity of the reaction from two different aspects : (i) They have estimated their observations on the application of the CHR to persons and animals suffering from various platyhelminth infections and record negative results in persons suffering from *Echinococcus* (three cases), *Diphyllobothrium latum* (one case) and *Fasciola hepatica* (three cases), although the sera of cattle with fascioliasis had given a positive reaction. (ii) They have carried out a series of observations on the presence or absence of the CHR when living cercariae of various species of trematodes were immersed in the sera of animals infected with *S. mansoni*. The cercariae of *Diplostomum spathaceum*, *Cercaria letifera*, *Opisthorchis felineus*, *Xiphidio* sp., *Echinococcus* sp., and *Diplodiscus subclavatus* all gave negative results. On the other hand cercariae of the *ocellata* group (members of the genus *Tricho-bilharzia* and closely allied to the *Schistosoma*) gave a positive reaction. As a result of these observations and of those previously recorded, the authors are of the opinion that the CHR is of considerable practical value in diagnosing present or recent infections in cases in which schistosome eggs are no longer present in the urine or faeces.

In a recent publication [this *Bulletin*, 1949, v. 46, 55] PAPIRMEISTER and BANG have reported on the occurrence of precipitates round *S. mansoni* cercariae immersed in the serum of monkeys infected with the adult forms of this parasite.

Vogel and Minning discuss these findings at considerable length and come to the conclusion that the reaction observed by Papirmeister and Bang differs from the CHR and is similar to the loose voluminous precipitate which they (Vogel and Minning) have described as occurring with the sera of various species of mammalian hosts, regardless of any previous history of trematode infection.

R. M. Gordon

SOFIA, F. Su un raro caso di localizzazione cerebrale dello *Schistosoma mansoni* in un ragazzo eritreo. [**Cerebral Localization of** *Schistosoma mansoni* **in an Eritrean Boy.**] *Acta Med. Italica.* 1950, Jan., v. 5, No. 1, 13–16. [21 refs.] English summary.

A boy of 13 years had lived at Hebo and was accustomed to paddle (*bagnarsi i piedi*) in the local pools. Ten months before he came under the author's observation he had been sent to a boarding-school at Addis Abeba. Two months later he suffered from abdominal pain and diarrhoea with blood and mucus, and ova of *Schistosoma mansoni* were found in the stools. Soon after, he complained of violent attacks of headache, in the right parieto-temporal area. The Wassermann reaction was negative, both with serum and cerebrospinal fluid, the Casoni test negative—the possibility of cerebral echinococcus was thought of—fundi were normal and no abnormality was detected in radiograms of the skull. The headaches came on quite irregularly and might pass off in an hour or might persist for the whole day. Next, he began to exhibit convulsive attacks preceded by horizontal nystagmus, Jacksonian in character, without loss of consciousness, varying in frequency with intervals of one half to two hours. Speech was slow, with nasal timbre, the soft palate and uvula deviated to the right, indicative of a lesion at the base of the right frontal convolution.

Antimony was administered intravenously each day in doses of 0·025–0·1 gm. Recovery was complete ; the nervous symptoms cleared up and ova were no more seen in the faeces. This is said to be only the tenth case on record of *S. mansoni* infection associated with cerebral symptoms. [See also this *Bulletin*, 1948, v. 45, 716, 721, 1017.]

H. Harold Scott

COURTOIS, G. Contribution au diagnostic et au traitement de la bilharziose intestinale à *Sch. mansoni*. [**Diagnosis and Treatment of** *Schistosoma mansoni* **Infections.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 427–45. [41 refs.]

In the Belgian Congo intestinal schistosomiasis is on the increase both in its incidence and in its distribution ; 1,997 cases of the disease were reported in 1933, and 7 545 in 1946, but these figures must be considerably below the actual numbers of cases. It is generally agreed that diagnosis of the infected state fundamentally rests on the recovery of ova of the parasites ; skin tests and complement deviation tests are merely adjuvants to diagnosis, and are unreliable. After a review of the advocated methods of obtaining ova by scraping the rectal mucosa, by rectal biopsy, and by their recovery from stools by concentration methods, the author is of the opinion that Morin's method of stool enrichment by filtration of a formolized suspension of faeces through silk with 32 threads to the centimetre, giving an aperture of at least 225 μ, proves as effective as any of them. KUNERT (this *Bulletin*, 1939, v. 36, 622) observed that treatment with Bayer 205 caused ova of *Schistosoma haematobium* to appear in the stools in increased numbers and so they could be demonstrated there when they could not be disclosed by other means of examination. The author found that a provocative injection of 2 gm. of this drug intravenously was similarly effective in revealing concealed *S. mansoni* infections. Figures

are cited to illustrate the infection rates as disclosed by (1) simple microscopical examination of the stools, (2) stool concentration methods, and (3) the use of the latter in conjunction with a provocative dose of Bayer 205 given intravenously 24 to 48 hours previously. Simple examinations of the stools are unreliable and ineffective in revealing small numbers of eggs in the stools.

The use of Bayer 205 in conjunction with Morin's enrichment method of stool examination disclosed a very high incidence of infection with *S. mansoni* among a population on the shores of Lake Albert, among whom clinical symptoms of the infection were unusual. The cure of an intestinal schistosomiasis infection entails the permanent disappearance of ova from the stools. The author, to assess the effect of treatment, examined stools on two consecutive days by Morin's enrichment method one to six weeks after treatment. If no ova were found in the stools by this means an injection of Bayer 205 was given intravenously and the stools were re-examined in a similar manner. If again no ova were found the same procedure was followed three months later, and if ova were still absent the patient was pronounced cured. Reinfections were subsequently demonstrated among the cured, and there was no evidence of an immunity resulting from a previous infection.

The drugs employed in treatment were tartar emetic [the salt is not specified], Fouadin, anthiomaline, stilbamidine, Germanin [Bayer 205] and Glucantime (a Rhône-Poulenc pentavalent antimonial, No. 2168 R.P.—described as the antimoniate of N-methylglucamine). Of these drugs tartar emetic (over 200 cases treated) and Glucantime (three cases treated) proved very efficacious; Fouadin (20 cases treated) and anthiomaline (six cases treated) were less so; and Germanin (15 cases treated) proved very uncertain in its action. Stilbamidine, used in one case only, was therapeutically valueless.

A. R. D. Adams

KIKUTH, W. & GÖNNERT, R. Miracil, ein neues therapeutisches Mittel gegen menschliche Bilharziose. [**Miracil, a New Therapeutic Agent against Human Schistosomiasis.** *Zent. f. Bakt.* I. Abt. Orig. 1949, Aug. 25, v. 154, Nos. 3/5, Bericht pp. 148*–50*.

A short summary, which contains no new information.

KHALIL Bey, M. **The National Campaign for the Treatment and Control of Bilharziasis from the Scientific and Economic Aspects.** *J. Roy. Egyptian Med. Ass.* 1949, Nov.–Dec., v. 32, Nos. 11/12, 817–56, 1 chart & 1 fig. [32 refs.]

Khalil reviews the history of the National Campaign in Egypt against bilharziasis and underlines the great importance of the disease in the economy of Egypt. He gives an account of the treatment campaign which began in 1920 and of snail control campaigns in various endemic centres with special reference to the relative merits of sulphation of canals and weed clearance in the control of snails. The paper is largely a criticism of the work and results of the Bilharzia Snail Destruction Section.

J. J. C. Buckley

WOLFS, J. & DEVIGNAT, R. Note sur la lutte contre la Bilharziose à Costermansville. [**Note on the Campaign against Schistosomiasis in Costermansville.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 557–65, 3 graphs.

Experiments with copper sulphate in the control of water snails in Lake Kivu, having proved ineffective over a period of two years, laboratory experiments were carried out and it was found that in contact with the water of the

lake the copper sulphate was transformed into basic salts. Comparative trials in the laboratory with copper sulphate and copper oxide in various dilutions, showed that the sulphate acted more rapidly than the oxide on snails. Two points were chosen for field experiments with copper oxide. The first of these, a swimming pool, was treated with 0·75 kgm. for a distance of 50 metres once a week for six weeks and resulted in the complete disappearance of snails. The second point was also treated with 0·75 kgm. of copper oxide over a distance of 50 metres. Four applications over a period of about three weeks dispelled all the snails and the place was still free of them six weeks later.

J. J. C. Buckley

JACHOWSKI, L. A., Jr. & STIREWALT, M. A. **Toxicities of some Organic Chemicals to** *Australorbis glabratus*, **a Snail Vector of** *Schistosoma mansoni*. *J. Parasitology*. 1950, Apr., v. 36, No. 2, 152–4.

" In this series of tests alpha-chloro-esters and amides of aliphatic monobasic acids showed a more marked molluscacidal activity than the unchlorinated derivatives."

EHLERS, H. J. & KNÜTTGEN, H. Ein Fall von Distomatosis hepatica bei einem 8½ jährigen Mädchen. [**A Case of Distomatosis Hepatica in a Girl 8½ Years Old.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Dec., v. 1, No. 3, 364–78, 1 chart. [17 refs.]

Cases of human infection with *Fasciola hepatica* have been recorded from all parts of the world. After referring to estimates of the total number of cases known, the author discusses the life history of *Fasciola hepatica* and the human disease that it may cause. He then describes a case observed near Hamburg. The patient was a girl aged 8½ years, thin and underweight, suffering from headache, fever and malaise, but with no other important symptoms. There was marked pallor of the skin. The liver was enlarged and firm and there was an eosinophilia of 42 per cent. *Ascaris* eggs were found after repeated stool examinations. For a week the temperature varied between 37° Celsius in the morning to 39° Celsius in the evening, but lack of appetite and loss of weight continued and the eosinophilia increased to a maximum of 61 per cent., the liver enlarged further and was tender and firm, the right lobe descending to a level four fingers' breadth below the costal margin, and the left lobe into the spleen area. There was pain in the upper abdomen radiating to the left. There was no icterus, but a mild hypochromic anaemia developed. Ascaridol caused the expulsion of one female *Ascaris* after santonin had failed. Penicillin and supronal were given to treat a suspected hidden septic focus, without success. The abdominal form of lymphogranulomatosis, echinococcosis, trichiniasis and liver abscess or tumour were successively excluded. Seven weeks after admission to hospital eggs of *Fasciola hepatica* were found in the stools.

The condition was treated with emetine hydrochloride, the initial dose being " 0·0125 " daily for seven days, followed by " 0·025 " for eight days. This treatment removed the fever, which did not recur, and caused the expulsion of numerous *Fasciola* eggs. These eggs were passed for another two weeks, but towards the end of this time they rather suddenly decreased and then disappeared. Seven days after the end of the emetine treatment no eggs were found with a duodenal sound, nor after magnesium sulphate. After injection of " 0·3 " of Hymon, however, 11 *Fasciola* eggs were found in the first portion only of the sterile, turbid and slimy cystic bile, which contained brownish detritus. Probably these eggs were expelled from the fundus by the strong contraction of

the gall bladder caused by Hymon. One egg was found in the stools which probably also came from the gall bladder and was expelled by the magnesium sulphate given. No flukes were found in the stools.

The size and consistency of the liver were not changed by the treatment, but the appetite returned and weight was gained. The myelogram and the differential blood cell count are discussed. The eosinophilia lessened slowly and, four weeks after the end of treatment, it was between 25 and 30 per cent. The authors ascribe its gradual fall to slow elimination of substances excreted by the flukes. Four months after the cessation of treatment the child looked quite healthy, the liver had receded and there was an eosinophilia of 8 per cent. The stools then contained *Ascaris* eggs, but no eggs of *Fasciola* were found in the duodenal contents.

The child lived in a district intersected by ditches in which *Galba* [*Lymnaea*] *truncatula* was present, and cattle in the area were infected with *Fasciola hepatica*. She had eaten fruit taken from a ditch running alongside a fruit orchard. The authors think they were dealing, not with an acute phase of a long-standing infection, but with the first stage of the infection, not often seen in Germany, during which the young flukes wander in the liver and cause the "eosinophil syndrome" described by KOURI [this *Bulletin*, 1948, v. 45, 799].

G. Lapage

FERRO-LUZZI, G. Rapporto percentuale maschi-femmine nell'infestione da *Necator americanus* in Eritrea. [**Percentages of Male and Female Worms in *Necator americanus* Infestations in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1949, v. 9, Nos. 4/5, 315–18.

The English summary appended to the paper is as follows :—

"Counting directly the helminths in 50 Eritrean natives suffering with hookworm disease (Necator americanus) the author established that the percentage of males varies from 6 to 45 per cent, with an average of 23·3 per cent.

"Therefore the author emphasizes that the indirect methods, which are based on the count of the eggs, are not reliable (at least in this country) because they erroneously presume that the amount of males is 50 per cent.

"According to the opinion of the author the most reliable method is the direct one: i.e. the count of all the helminths which are eliminated after the administration of a proper anthelmintic."

VACCARO, U. La reazione di Costa negli anchilostomiasici. [**Costa's Reaction in Ankylostomiasis.**] *Acta Med. Italica.* 1950, Feb., v. 5, No. 2, 45–7. English summary (5 lines).

Costa's reaction is devised to reveal toxic-infective conditions and the intensity of them. It is carried out as follows: A solution of novocaine is prepared, 2 per cent. in physiological saline and to 1·5 cc. of this are added three drops of 5 per cent. sodium citrate solution in a test tube. Three drops of blood from puncture of the pulp of the finger are allowed to fall into this and the tube is reversed repeatedly to let the blood diffuse evenly in the fluid. It is then centrifuged; the red corpuscles are deposited leaving a clear supernatant. Next, one drop of pure formalin is added. If the reaction is positive, a greyish-yellow cloud forms within 15 minutes and this intensifies until a whitish powdery deposit gathers at the bottom which may aggregate to flocculi. In healthy subjects such a deposit will not be seen until the lapse of an hour or even longer. The reaction is not specific for helminthic infestation, but occurs in all conditions of a toxic-infective nature and is given in pregnancy, in patients with malignant tumours, not in benign unless there is infection, or suppuration, etc.

The test is a time-qualitative test. In a table the results in 14 hookworm patients are given. Before treatment the reaction was positive within 12 minutes and in 13 of them in ten minutes or less ; in one it was immediate and in two cases in one minute. After treatment in one patient it appeared in 40 minutes, in 11 not for 60–75 minutes. In three in whom the time was still under 15 minutes, the faeces still showed the ova. Of 13 cases of ascariasis the time in 12 was from 25 to 40 minutes before treatment and from 50 to 80 after treatment. The 13th was a case of mixed hookworm and Ascaris infestation and before treatment the time of reaction was ten minutes ; after treatment it was 64 minutes. The author claims that the test is of value in diagnosis and in estimating the progress and results of treatment. *H. Harold Scott*

DINNIK, J. A. Eigentümlichkeiten und Entstehung der verschiedenen Entwicklungsweisen bei den Larven der Strongylata (Nematoda). [**Characteristics and Origin of the Modes of Development of the Larvae of the Strongylata (Nematoda).**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Dec., v. 1, No. 3, 386–416, 16 figs. [Numerous refs.]

In this interesting paper the author reviews our knowledge of the development of the larval phases of trichostrongyles and lungworms which cause serious diseases of domesticated animals. Nematodes parasitic in man are not considered. *G. Lapage*

PALMER, E. D. **A Note on the Treatment of Strongyloidiasis with Intravenous Gentian Violet.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 91–2.

Gentian violet is widely used, by oral and transduodenal administration, in the treatment of strongyloidiasis : the therapeutic course is long and the drug is not absorbed sufficiently by these routes to reach the stages of the worm which do the greatest harm.

The author's previous experience with intravenous gentian violet [this *Bulletin*, 1945, v. 42, 135], and more recently in cases where there was dangerous active larval migration, was so encouraging that the method has been adopted regularly for the treatment of chronic strongyloidiasis.

The present paper records the treatment of 45 patients, 19 of whom probably acquired the *Strongyloides* infection in the South Pacific. Thirteen of the patients had had some form of treatment with gentian violet, either in oral courses or by attempts at transduodenal lavage (which were unsuccessful). In none of these patients had the infection been eradicated.

The solution for intravenous use consisted of 0·5 per cent. crystalline medicinal gentian violet in triply distilled water, filtered three times through sterile paper and stored in sterile bottles : fresh solutions were prepared every five days. Each patient received 20 ml. of the solution, injected slowly each day for 20 days. There were no untoward effects and no colour changes in the sclera, skin or urine. Sometimes crystals of the drug were found adhering to the sides of the syringe after the plunger had been withdrawn : but apparently any crystals actually injected go quickly into venous solution.

On the basis of six daily negative stools after the course and again two weeks later, 41 of the 45 patients were confirmed as having been cured by one course of 20 days intravenous therapy : the other four were cured by a second course.

It was noted that at the second series of stool examinations, the eosinophilia which had originally been present in all cases had disappeared in about 25 per cent. *H. J. O'D. Burke-Gaffney*

SCOTTI, G. & TRIPODI, P. Ascaridiosi gastrointestinale e sua diagnosi con l'esame delle feci e con l'esame radiologico del tubo digerente. [**Diagnosis of Intestinal Ascariasis by Examination of the Faeces and Radiological Examination of the Digestive Tract.**] *Arch. Ital. Sci. Med. Colon. e Parassit.* 1949, Dec., v. 30, Nos. 11/12, 182–90. [40 refs.] English summary.

ROSSI-ESPAGNET, A. Studio sulla comparsa di proteasi specifiche di difesa in soggetti infestati da *Ascaris lumbricoides*. [**On Specific Defensive Proteases in Ascariasis.**] *Riv. di Parassit.* Rome. 1950, Mar., v. 11, No. 1, 55–9. [24 refs.] English summary (6 lines).

ABDERHALDEN and his colleagues 20 years ago showed that the parenteral introduction of heterologous proteins led to the production of defensive ferments or proteases specific for the protein introduced. The author has applied this principle to certain persons infested with *Ascaris lumbricoides*. He prepared three extracts from the horse *Ascaris*: 1. From the skin and subcutaneous tissue; 2. From the muscles; 3. From the internal organs, and tested them in 10 patients with *A. lumbricoides*. All reacted to the second of these most strongly; 7 reacted to the first, but to a less degree, and only 4 to the third. Four healthy controls did not react to any of the extracts. The muscle extract would, therefore, be serviceable in diagnosis. Investigation as to the duration of the reaction after expulsion of the parasites is to be the subject of further study. [If this principle is found to have wider application, it should prove useful in obscure helminthic infestations, but it would hardly be needed for *Ascaris* when faecal examination so easily discovers the characteristic ova. The present article does not mention the modes of preparation of the extracts nor the doses injected.] *H. Harold Scott*

MÜLLER, R. W. Über Allergie und Immunität hei der Ascarisinfektion des Menschen. [**On Allergy and Immunity in *Ascaris* Infection of Man.**] *Ztschr. f. Hyg. u. Infektionskr.* 1949, Sept. 28, v. 130, Nos. 1/2, 28–35. [32 refs.]

The author discusses how far clinical observations on the passage of *Ascaris* larvae through the lungs of man throw light on allergy and immunity to this infection. He discusses work done by himself and others on transient eosinophil infiltration of the lung, including Loeffler's infiltration, and concludes that this condition is always caused by *Ascaris* larvae and that most of the cases of eosinophil pneumonia in Germany are attributable to *Ascaris*.

Large numbers of X-ray examinations were done at Wangen-im-Allgäu on the following four groups of people :—

(1) The native Swabian population ;
(2) Germans from East Germany ;
(3) Relatives of the garrison and administrative personnel in France ;
(4) Displaced persons from Poland, Hungary, the Ukraine, the Baltic, etc.

These examinations, done between 1945 and 1947, showed that, among the adults, the eosinophil infiltrations of the lungs were more frequent and severe among the immigrants, who were not markedly infected with *Ascaris*, and fewer and less severe among the Swabian people, although the latter showed a high incidence of *Ascaris* infection, due largely, the author thinks, to the top-dressing of land with manure [presumably human]. No differences between the children of these two groups were observed. Eosinophil pneumonia was found among the doctors who were not native Swabians, but practically never among the nursing sisters, who were Swabians.

Quoting examinations of human patients and work on *Nippostrongylus muris* of rats and *Schistosoma* in monkeys, which suggest that repeated infections provoke strong protective antigen-antibody reactions in the host, the author argues that, in man, these reactions can occur, not only in the lungs, but also in the liver and intestinal walls, which are filters which can hold up and damage *Ascaris* larvae. Clinical evidence of this host-reaction against them is shown only by the lungs [*e.g.*, as eosinophil infiltration]. If the larvae are held up in the liver or intestinal walls, no marked lung reactions occur. But a strong lung reaction is not to be expected to the first infection. This view needs, the author thinks, further experimental investigation, but it clarifies, he suggests, certain features which have eluded explanation for a long time. Among these are :—

(1) Ascariasis is a disease of children and is less important in adults and one of the reasons for this is the development of an immunity.

(2) In children severe eosinophil infiltration of the lungs is seldom seen, although it does occur.

(3) In the immigrants examined, important lung reactions did not occur until at least nine months after infection, *i.e.*, the protective reaction against *Ascaris* needs at least this time to develop. The author thinks this is because *Ascaris* is in contact with the host only in its larval phase and only then causes allergic phenomena. In this respect *Ascaris* differs from the hookworms and some other worms.

(4) A sudden marked general increase of *Ascaris* infections is not immediately associated with numerous cases of eosinophil pneumonia.

(5) There is evidence that, in about 25 per cent. of *Ascaris* infections, adult worms do not develop in the intestines, because the larvae can be destroyed in the lungs.

(6) In the cases of infiltration of the lung examined no larvae were found in the sputum, because the infective dose of larvae was small and some larvae were destroyed in the lungs. But BIRK [this *Bulletin*, 1933, v. 30, 684] found a larva in the sputum of a child with bronchitis, but no eosinophil lung infiltration. The larvae often pass through the lungs of children without causing eosinophil infiltration. The author cites a paper on a small epidemic of eosinophil bronchitis without eosinophil infiltration of the lungs and mentions a case of his own in which the larvae were destroyed in the lungs.

Loeffler's eosinophil infiltration of the lungs is thus to be regarded, not so much as the simple expression of the passage of the larvae of *Ascaris* through the lungs, but more as a specific defence reaction of the body, helped by an antigen-antibody reaction connected with several previous infections with this round worm. *G. Lapage*

NAVARRANNE, P. Considérations sur les accidents post-opératoires dus à l'ascaridiose. [**Post-Operative Complications due to *Ascaris* Infection.**] *Méd. Trop.* Marseilles. 1949, Sept.–Oct., v. 9, No. 5, 823–8. [21 refs.]

This paper deals not with the well-known surgical complications of ascariasis, but with troubles liable to occur after abdominal operations in subjects who harbour the parasite.

1. "*Verminous colic*" may occur on the day after operation, with abdominal pain and vomiting, slight elevation of temperature and an anxious facial expression suggestive of peritonitis. Abdominal signs are absent or slight and the passage of worms, or the vomiting of them, usually settles the diagnosis and the patient recovers.

2. *Post-operative peritonitis* occurs later than the preceding, usually about the third to the sixth day ; the onset of symptoms is more gradual than is the case in perforation of the intestine, but the symptoms and signs are those of a progressive peritonitis. Re-operation has not been possible and all the recorded cases have terminated fatally. Autopsies have shown the presence of one or more worms free in the peritoneal cavity, though the sutures were intact and there were no other perforations of the stomach or intestines by which the worms could have escaped. Probably migration took place between the freshly inserted intestinal sutures before the line of union became firmly sealed. An observation is recorded by one author who, at autopsy, actually found two worms passing between the sutures placed a few hours before for repair of a wounded intestine in a child who died shortly after the operation.

Post-operative fistula is illustrated by a case under the author's observation. Twelve days after a gastrectomy for chronic ulcer on the lesser curve of the stomach a fistula opened in the wound, and an ascaris was extracted from it. No further complications followed, the fistula healed and later several ascarides were passed after santonin treatment. The worm in this case must have traversed the gastro-jejunal line of suture and the peritoneum without setting up peritonitis. Several similar recorded cases are quoted and a bibliography is given. The author emphasizes the necessity of searching for and treating the condition before any abdominal operation is undertaken.

W. L. Harnett

MARKS, J. H. **Filariasis with Testicular Involvement. Report of a Case.** *South African Med. J.* 1950, Mar. 18, v. 23, No. 11, 185–7, 2 figs.

A case in an African mine labourer from Tanganyika.

RAMAN, T. K., RAMAMURTHY, B. & PINAKAPANI, S. **Hetrazan (1-Diethylcarbamyl-4-Methylpiperazine Hydrochloride) (Diethylcarbamazine) in the Treatment of Filariasis** (*Wuchereria bancrofti*). *J. Indian Med. Ass.* 1950, Feb., v. 19, No. 5, 163–72. [13 refs.]

Seven cases of filariasis due to *Wuchereria bancrofti* were treated with hetrazan (0·45–2·2 mgm. per kgm. body weight) daily in three divided doses for 21 days. At the end of treatment most of the microfilariae had disappeared from the blood but an occasional one could be found by concentrating 1 cc. of blood with 0·1 per cent. formalin. Two of the cases had chyluria with microfilariae in the urine ; under treatment the microfilariae disappeared from the urine but the chyluria persisted in one case. Most of the patients had mild allergic reactions after the first dose of hetrazan. Fever was present in four cases and varied from 99 to 101°F. ; usually it lasted two days. Headache was present in three cases and in one patient it was so severe that treatment had to be interrupted for four days. Pain all over the body occurred in four cases. Increased pain and tenderness occurred in three patients whose genitals already showed filarial lymphangitis. Subcutaneous nodules occurred in the arm of one patient under treatment.

F. Hawking

TERESA HERRERO, Maria. Hetrazán : un nuevo compuesto para el tratamiento de la filariasis. [**Hetrazan : a New Compound for the Treatment of Filariasis.**] *Med. Colonial.* Madrid. 1950, Apr. 1, v. 15, No. 4, 356–64.

A general review.

BRICEÑO ROSSI, A. L. & MAYER, M. Mansonella ozzardi en Venezuela. [*Mansonella ozzardi* **in Venezuela.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 92–3.

The English summary appended to the paper is as follows :—

" The authors describe the finding of Mansonella ozzardi in Indians of South Venezuela (Upper Orinoco), apparently not observed before in Venezuela."

MAIER, E. H. Über örtliche Eosinophilie im sogenannten " dicken Tropfen " um Mikrofilarien von Loa Loa und Filaria perstans. [**Localized Eosinophilia in Thick Blood Films around Microfilariae of** *Loa loa* **and** *Acanthocheilonema perstans.*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1949, Dec., v. 1, No. 3, 416–20, 1 fig.

During routine examinations of thick films, made from patients suffering from diverse diseases and admitted to a hospital in Fernando Po, the author noted that clumps of eosinophiles occurred in a high proportion of the films examined, and that this localized eosinophilia was most marked in the neighbourhood of microfilariae, either *Loa loa* or *Acanthocheilonema perstans*. The phenomenon was then studied in more detail and repeated counts of leucocytes were made on blood films obtained from 86 patients. In each instance the proportion of non-eosinophiles to eosinophiles was estimated in the following areas : *Area 1*—one field of the microscope showing a microfilaria in its centre ; *area 2*—the adjacent circular zone one field in width ; *area 3*—a zone surrounding area 2, also one field diameter in width.

The results obtained from examining, in this manner, thick films obtained from the 86 patients, are set out in a table arranged in six columns. Column 1 shows the number of microfilariae per " ccm." of the patient's blood [judging by the figures as presented " ccm." is a misprint for cmm.]. Column 2 shows the proportion of non-eosinophiles to eosinophiles in the peripheral blood. Columns 3, 4 and 5 show the proportion of non-eosinophiles to eosinophiles in the three zones already described. Column 6 shows the results, *i.e.*, whether positive or negative, as judged by whether there was a definite increase in the density of eosinophiles around the microfilariae. A positive result is stated to have been observed in 75 (87 per cent.) of the bloods examined.

The author discusses various possible explanations of the phenomenon and inclines to the view that the microfilariae of *L. loa* and *A. perstans* excrete a substance which has the power of attracting eosinophiles (*eosinophilen-anlockende Substanz*). He then postulates that in a thick film preparation this hypothetical substance collects around the microfilariae as soon as they become fixed in position, as a result of commencing coagulation of the blood, and when the eddies and disturbances caused by the active movements of the lashing microfilariae have ceased.

R. M. Gordon

VAN DEN BERGHE, L. & CHARDOME, M. Une microfilaire du gorille, *Microfilaria gorillae*. [*Microfilaria gorillae* **in Gorillas.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 495–9.

A new species of microfilaria, " *Mf. gorillae* ", was found in the blood of 6 out of 11 gorillas examined at Ituri, Belgian Congo. It resembles the microfilaria of *Acanthocheilonema perstans* of man and of *Dipetalonema vanhoofi* from the chimpanzee, but differs from them notably in the smaller length, which averages 170·78 μ. [See also this *Bulletin*, 1947, v. 44, 339.]

J. J. C. Buckley

BARNLEY, G. R. **Onchocerciasis in Kigezi District, Uganda.** *East African Med. J.* 1949, Oct., v. 26, No. 10, 308–10.

A newly discovered focus of onchocerciasis in the Kigezi district of Uganda is described. It lies at an altitude of over 5,000 feet in mountainous and heavily forested country intersected by rapidly flowing streams. Skin snips from 1,847 of the inhabitants were examined for microfilariae (the snips were kept in saline in small tubes and the fluid was withdrawn after two hours by capillary pipettes, then examined under the low power of a microscope). The incidence of the disease among this series was as follows : 67 per cent. had microfilariae in skin snips, 35 per cent. had skin changes, 10 per cent. had nodules and 5 per cent. were blind. The incidence of infection varied according to age (from 30 per cent. in those of 10–15 years to 78 per cent. in those of 35–40 years), and to locality—the most heavily infected coming from forested regions, the most lightly from treeless areas devoid of rapid streams.

Searches for insect vectors were made when the rivers were very low, and only five *Simulium neavei* were caught in 100 " boy-hours ", so there remains some doubt as to what insect was transmitting the infection. *Culicoides* species including *grahami* were present in large numbers. *P. C. C. Garnham*

LUIS GONZÁLEZ, C., POTENZA, L., VOLGELSANG, E., ANDUZE, P. J. & TORRES E., P. Oncocercosis en Venezuela. [**Onchocerciasis in Venezuela.**] *Bol. Oficina Sanitaria Panamericana.* 1950, Feb., v. 29, No. 2, 147–52, 2 figs. & 1 map. English summary.

A small part of eastern Venezuela only is the subject of this short article. The area is agricultural, with valleys and numerous water-courses. It is situated between 250 and 1,000 metres above sea-level. The rate of infection with *Onchocerca* was found to be high and it is very probable that the area of infection is much more extensive than the comparatively small part investigated. The inhabitants are mainly gathered around the water-courses and in them they bathe and the women wash clothes. The total population of the area is not given, but 883 persons were examined—at least 3 biopsies for each person and in a few as many as 16 in order that progress might be studied—of whom 427 were males and 456 females ; 217 (24·6 per cent.) were found infected and the sexes nearly equally ; males 102 out of 427 (23·2 per cent.) and females 115 out of 456 (25·2). The percentage infected increased with age. Up to 20 years males were more infected : 1–9 years 5·4 per cent. males, 2·8 per cent. females ; 10–19 years 20·1 and 15·4 per cent., respectively. In the next two decades females infected predominated, 44·7 and 53·5 per cent. as against 24·5 and 37·2 among males ; from 40 years on, of 70 males examined 36 were infected and of 33 females 17 were infected ; in successive decades the total percentages infected (*i.e.*, both sexes together) were 4·1, 17·6, 37·7, 45·8 and 51·5.

Clinical symptoms were few ; in a certain number of patients there were lichenoid and ichthyoid lesions of the skin, but the majority could hardly be called " patients " for they presented no clinical symptoms or the nodules were disregarded. These nodules were most on the trunk and the sacro-iliac region ; they were rare on the head and no case of onchocercal blindness was met with, though a few suffered from punctate keratitis and some had microfilariae in the aqueous humour (but the number examined ophthalmologically was " relatively small ").

Several species of Simulium were captured : *S. metallicum*, *S. paraguayense*, *S. lutzianum*, *S. mathesoni*, *S. versicolor* and *S. mexicanum*. The first-named was caught biting at all hours of the day. The captures were made during a

fairly dry season. The inhabitants volunteered the information that in the rainy season Simuliidae are abundant and very troublesome, especially one of a yellow colour (possibly *S. ochraceum*). *H. Harold Scott*

BECKER, C. K. Filaires adultes (*Onchocerca volvulus*) libres dans les tissus. [**Free Forms of Adult Filarial Worms** (*Onchocerca volvulus*) **in the Tissues.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Mar. 31, v. 30, No. 1, 9–10.

In many cases of *Onchocerca volvulus* infection, typical nodules are not found (the author refers to 50 such cases in a recent series of 135 treated with Hetrazan) and it may well be that the presence of free forms of the adult worms in the tissues is not so exceptional as has been suspected.

He now reports three cases in Africans (two women and a man) from the North-East of the Belgian Congo, in which female adult forms of *O. volvulus* were found in the tissues. All were encountered in the course of operation, two for inguinal hernia and one for Caesarian section. The worms were found respectively in the subcutaneous tissue near the external inguinal ring, between the layers of the abdominal muscles and in the uterine muscle.

All these worms were living, motile and unmistakably free in the tissues, with no sign of neighbouring inflammatory reaction. They were extracted with ease and were found to measure between 350 and 400 mm.

H. J. O'D. Burke-Gaffney

NETTEL F., R. Importancia de la investigación de microfilarias de *Onchocerca volvulus*, en el liquido intersticial de la dermis de la piel. [**Examination of Dermal Lymph for Embryos of** *Onchocerca volvulus*.] *Medicina*. Mexico. 1950, Jan. 25, v. 30, No. 596, 21–5, 3 figs. [20 refs.] English summary.

The finding of embryos of *O. volvulus* by biopsy sections has been carried out for some 20 years. The method here described is based on that used by León y Blanco for studying the pinta spirochaete, namely scarification of the skin and, by pressure with forceps, obtaining the clear lymph. The author modifies this as follows: he disinfects the portion of skin selected, takes up a fold of it between finger and thumb and presses it between the blades of forceps till it becomes pallid. If it remains reddened the surface is lightly rubbed to drive away the red cells from the capillaries. After a few seconds one punctures the middle of the fold with a fine needle to a depth of 0·5–1·0 mm. In the exuding fluid abundant living filarial embryos are seen. The advantages claimed for this procedure are: (1) that several parts of the body can be examined without harm to the patient; even the face without leaving a scar as does biopsy, and the punctures soon disappear; (2) the microfilariae are living and intact; (3) the fluid coagulates on the slide forming a protective film, instead of the microfilariae being injured by the fixation necessary for studying biopsy specimens; (4) the drop may be coloured by a vital stain for studying the histological structure of the embryo; (5) there is no need for a local anaesthetic as there is for taking biopsy specimens.

H. Harold Scott

NETTEL F., R. Observaciones sobre la cantidad de simulidos colectados en un lugar de la zona oncocercosica de Chiapas, durante la temporada seca. [**On the Number of Simuliids captured in the Dry Season, in a Spot infested with Onchocerciasis.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Dec., v. 10, No. 4, 345–53, 5 figs. English summary (8 lines).

The author reports on the number of adult *Simulium* captured in the State of Chiapas, Mexico, throughout the 12 months. Among a total of over 50,000

specimens, *S. ochraceum* was always most abundant, amounting to about 85 per cent. of the annual total. The only other species captured were *S. callidum* and *metallicum*. The number captured during the dry season was about four times that during the rains. [The author does not discuss whether the number captured in any way reflects the total population : whether perhaps they come to man in large numbers in the dry season because they are thirsty or because other hosts are absent, or because of some climatic conditions. A large amount of thought and research will be required before it is possible to assess the value of these figures.] *P. A. Buxton*

WANSON, M., COURTOIS, L. & LEBIED, B. L'éradication du *Simulium damnosum* (Théobald) à Léopoldville. [**Eradication of** *Simulium damnosum* **in Léopoldville.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Sept. 30, v. 29, No. 3, 373–403, 1 folding graph.

Onchocerciasis spread by *Simulium damnosum* is unpleasantly common in the neighbourhood of Léopoldville, Belgian Congo, about 45 per cent. of Europeans being affected. In the villages bordering the rapids, females of *Simulium damnosum* harbour larvae of *Onchocerca volvulus* to the extent of 16·2 per cent. In addition, the bites of the fly are very irritating to man and animals.

The larval breeding sites are, fortunately, defined with precision in the rocky rapids of the Congo just downstream from Léopoldville and Brazzaville. Below the village of Kinsuka, there are very few breeding places for a stretch of 100 kilometres, which distance is sufficient to render the sites unimportant as regards the towns mentioned.

The fly population varies considerably in different parts of the year, according to changes in the height of the river, which affect the numbers of flies emerging. Certain kinds of aquatic vegetation form emergence supports, and these are exposed to different extents in different months. By far the most important of these plants is *Pennisetum nodoflorum*, a bamboo-like form. Great numbers of flies emerge from colonies on the stems throughout October to January. Other important sites are provided by Podostemaceae (curious dicotyledons resembling large green algae) and floating masses of *Vossia* and *Echinochloa* which become wedged among the rocks.

An attack on the *Simulium* was made in 1942 by destruction of *Pennisetum* along the breeding sites : some 65,000 roots were eradicated. In addition, masses of floating plants were dislodged and certain rocks and trees brushed clean of vegetation. The results of this effort were observed by regular fly-catching operators and their data are expressed in terms of numbers caught (at specified points) divided by (numbers of catchers multiplied by hours of work) for the month.

The results were only partially successful. Numbers of *Simulium* were reduced but not very severely, even after a second campaign in 1944. The peak of abundance has shifted to an earlier part of the year. In dry years there was extensive breeding on the Podostemaceae.

The introduction of the new insecticides DDT and *gamma* BHC suggested their use in the attack on *Simulium*. Elsewhere (FAIRCHILD and BARREDA in Guatemala [this *Bulletin*, 1946, v. 43, 680] and GARNHAM and MACMAHON in Kenya [*ibid.*, 1947, v. 44, 1084]) DDT had been successfully used against *Simulium* larvae. But the enormous flow of the Congo at Léopoldville (26,000 to 75,000 cubic metres per second) made that seem impracticable owing to the vast quantities of emulsion which would be required.

Alternatively, an attack on the adult *Simulium* was considered. Laboratory tests with papers treated with DDT, showed that *Simulium* adults are rather sensitive to contact insecticides. Thus :—

Effects following 30 seconds' contact	*Simulium damnosum*	*Simulium albiunguiatum*	*Anopheles gambiae*	*Musca cuthbertsoni*	*Chrysomyia putoria*	*Glossina palpalis*
DDT (50 mgm./m²)						
Knockdown	7 m.	7 m.	40 m.	45 m.	120 m.	30 m.
Kill ...	5 h.	5 h.	6 h.	6 h.	6 h.	4 h.
BHC (5 mgm./m.²)						
Knockdown	7 m.	7 m.	30 m.	30 m.	45 m.	30 m.
Kill ...	90 m.	90 m.	3 h.	3 h.	3 h.	2 h.
Pyrethrins (50 mgm./m.²)						
Knockdown	3 m.	3 m.	3 m.	3 m.	3 m.	3 m.
Kill ...	5 h.	5 h.	12 h.	12 h.	18 h.	6 h.

(m.=minutes ; h.=hours)

A circumstance which rendered the attack on adults hopeful, was the congregation of flies on leaves of vegetation along the banks of the river (especially leaves and flowers of *Baphia bossenge* and *Uapaca guineensis*). The first experiments were made by discharging DDT-smoke bombs at different points [see this *Bulletin*, 1950, v. 47, 455]. But these tests seemed unpromising. Much better results were obtained by aerial spraying, with the use of an Air-Speed Oxford aeroplane flying at 200 km./hr. at a height of 10 to 15 metres. The aeroplane carried 560 litres of 20 per cent. DDT (80 per cent. *para para*) in a 3 : 7 mixture of toluene and gas oil. This was atomized by a nozzle projecting into the exhaust and produced a cloud theoretically covering 20 hectares per minutes with 20 mgm. pp'DDT per square metre. The residual effect of the deposit obtained on vegetation was not over 48 hours, owing to decomposition of DDT. Five preliminary flights showed the promise of the method, and these were followed by a campaign of daily treatments by flying along the breeding zones for 26 days (October, 1948). The effect was a virtual elimination of *Simulium* from Léopoldville and surrounding villages. The mean monthly catch of about 2,000 females dropped to a total of 255 caught during seven months (October, 1948 to April, 1949).

The careful efforts of catchers were able to detect re-invasion of *Simulium* from distant sites at the rate of about one female per day. By careful searches in different directions, the small dangerous sites were discovered and subjected to aerial treatment. Re-invasion was believed to be finally checked at the end of 1949.

Elimination of *Simulium* from Léopoldville will not eradicate onchocerciasis until a new generation of inhabitants appears. To check the present state, an examination revealed the following degree of infection among children :—

7 per cent. among 140 aged 3–4 years
37 „ „ „ 240 „ 4–8 „
60 „ „ „ [?] „ 9–15 „

The cost of air spraying is given as 8,560 francs per hour, making a total of 243,227 francs for the campaign. *J. R. Busvine*

BHANDARI, R. M. **Penicillin in Guinea Worm Infection.** *Indian Med. Gaz.* **1949, Dec., v. 84, No. 12, 548–50.**

The traditional treatment for guinea worm infection in India is the extraction of the worm by suction by " guinea-worm surgeons ", many of whom are very skilful. Also indigenous drugs are used, by mouth and local application. The author states that from personal observation he has decided that some of these are effective, though not specific in their action, and others are not. He gives the following list :—

Marking-nut [*Semecarpus anacardium*] wrapped in *gur*, burnt lime in curd, alum, benzoic acid, and arsenious acid in lime juice : the last-named is applied locally to the presenting portion of the worm. [Unfortunately, he does not state which he considers the specific ones.]

In hospitals in India, penicillin has been used for the secondary infections but not apparently as a specific against the worm.

The author now reports five cases in which he considers that penicillin has acted on the guinea worm itself. In three of these cases there was cellulitis as a result of the worm breaking during extraction and in two the worm had not presented. He injected 25,000 units of penicillin G solution daily into the local swelling caused by the worm. In all three cases the worm became thinner and thinner, and eventually disappeared completely without causing any pain, swelling or discomfort.

The five cases are reported in detail ; penicillin was given for seven, five, ten, eight and ten days, respectively. *L. E. Napier*

HEILMANN, C. G. **Enterobiasis among Patients in the Roanoke Veterans Adm. Hospital.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 93–5, 1 fig.

This survey was made to determine the rate of *Enterobius* infection in patients in a Veterens' Administration hospital in Virginia [the context suggests that this is a mental institution, though this is not stated].

Anal swabs were taken from 1,460 patients and 176 (12·05 per cent.) [given in the text as 11·98 per cent.] were found to be infected. Each of ten wards was studied in sections and a detailed table shows the results in terms of each ward as a whole and of individual sections. The percentage of positive findings for wards varied from 0·7 to 33·3. In the ward giving the latter figure one section showed 64·6 per cent. of positive results, but it is stated that in this section the group consisted of deteriorating patients not being able to take care of themselves : otherwise the highest percentage in any ward was 19·63. The findings in individual sections varied from nil to 34·9 per cent. (excluding the section referred to above).

The author points out that the infection rate of 11·98 per cent. compares favourably with the results of CRAM who reported 35 per cent. among 600 members of the general population in Washington and SMITH who found 65·15 per cent. in an institution for mentally deficient [no references are given to these findings] : and he concludes that the survey makes it apparent that the personal hygiene and sanitation maintained in the Roanoke hospital is above average. [It would perhaps be necessary to include a wider series of samplings from other sources before a general average could be quoted for comparative purposes.] *H. J. O'D. Burke-Gaffney*

SCHÜFFNER, W. Retrograde Oxyuren-Infektion, " Retrofektion ". IV. Mitteilung. [**Retrograde** *Enterobius* **Infection, " Retrofection.**"] *Zent. f. Bakt.* I. Abt. Orig. 1949, Aug. 25, v. 154, Nos. 3/5, 220–34, 3 figs. [22 refs.]

In this article the author gives further information on a method of infection with *Enterobius vermicularis* which he and SWELLENGREBEL have described as

retrofection, in which some of the eggs laid on the perianal skin hatch after developing to the infective stage, with migration of the larvae through the anus to develop to the mature adult in the colon [this *Bulletin*, 1949, v. 46, 858–869]. He describes the same experiments which formed the basis of one of the previous articles, but gives more clinical details. The discussion assesses the evidence for its occurrence and deals with the importance and epidemiology of the method of transmission in clinical practice.

The "Turnus Heubner" is described as a clinical entity; a patient, who is usually an adult, suffers from a repeated recurrence of short and mild thread-worm infections separated by an interval of 40 or 50 days. The primary attack commonly follows a mild indirect infection from contaminated food, and in the absence of re-infection, no eggs are to be found on the perineum until this generation has matured. The adults are passed, and the eggs are found for a few days, then the latent interval occurs during which no eggs are found, and this represents the time interval during which the next generation matures. Heubner originally described this clinical entity in light infections with repeated intermissions and considered that it was due to the low-grade transference of eggs by the fingers. Schuffner considers that this pattern of infection is due to retrofection.

Schuffner discusses the evidence for this contention which is presented by the three experiments already described in the previous article and re-described in this present paper.

1. The recurrent and intermittent low-grade infection in each of the three experiments was unlikely to be due to intercurrent accidental infection as examinations were made of the perianal skin for long periods before the larvae were placed on the perineum in order to produce the first infection.

2. The possibility of dust-borne infection was eliminated as far as possible by the choice of an environment in which this was unlikely; a teacher, for example, would have been an unsatisfactory subject for such an experiment.

3. Finger infection was excluded by the subject (Professor Schüffner himself was one of them), and other members of the households of the subjects acted as controls.

The clinical types of infection due to direct finger transmission, indirect finger transmission, contamination of food, dustborne infection and retrofection are compared graphically, and it is shown that the type due to retrofection differs characteristically from the other three. In light infections it is possible to recognize the type of infection due to hatching of the larvae from infected eggs on the perineum with their migration up the colon to develop to maturity, while in heavier infections and where finger or dust infections may occur this is not possible. The absence of larvae on the perineal skin cannot be considered as valid evidence against the occurrence of retrofection for the speed of migration on the perineum of these hatched larvae is so rapid (6 mm. per minute), that they can retire to the anus in a very short time, and consequently will not be observed in the perineum. Empty egg shells may be found in the perineum.

The author then discusses the epidemiological significance in this method of re-infection. That it does not occur in every case may be due to several causes. The variability of the perianal environment may influence the hatching of eggs. There may be differences in a hypothetical immunity which man may develop to *E. vermicularis* and of which there is little knowledge. Different strains of the parasite may exist, some of which may hatch more readily than others, and thus infections with a particular strain may be associated with retrofection.

In children this method of re-infection is probably overshadowed by finger contamination. The diagnosis of retrofection should be easy as it can only be established in low-grade infections which have previously been considered to be

due to uncleanliness and in which there has been a puzzling lack of definition in the pattern of infection; these infections may thus be due to retrofection. This type of infection is confined to one person and is not transmissible. The author suggests that *E. vermicularis* may have developed this special additional method of infection to overcome the low chance of survival in hot climates.

W. E. Kershaw

STRAUSS, H. Subileus durch Oxyurenbefall. [**Subileus from** *Enterobius* **Infestation.**] *Med. Klin.* 1950, Mar. 17, v. 45, No. 11, 340–41.

This case refers to a man of 60 with a massive reinfection with *Enterobius* who developed a condition resembling sub-ileus. He had been treated with purgatives and a high enema. During six months' observation no more worms were found. The author confirms the statement of ERHARDT [this *Bulletin*, 1948, v. 45, 1023] that, in the absence of reinfection, spontaneous recovery of enterobiasis eventually occurs.

H. J. O'D. Burke-Gaffney

CALERO M., C. & ORTIZ O., P. Triquinosis en Panamá. [**Trichinosis in Panama.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Dec., v. 10, No. 4, 355–8.

The English summary appended to the paper is as follows :—

" The results are presented of the examination of 351 rats gathered in the city of Panama and its surroundings and which were examined with the object of determining their infection by cysts and larvae of *Trichinella spiralis*, utilizing the techniques of compression and digestion. None of the rats was found to be infected."

HENDRICKS, J. R. **The Relationship between Precipitin Titer and Number of** *Trichinella spiralis* **in the Intestinal Tract of Mice following Test Infections.** *J. Immunology.* 1950, Mar., v. 64, No. 3, 173–7. [15 refs.]

" Four experiments, in which mice received 1 to 4 doses of 200 *Trichinella spiralis* larvae at 21-day intervals, revealed a marked progressive decrease in the percentage of worms recovered from the small intestine of the mice and a striking progressive increase in the precipitin titer of their sera. This effect was shown to vary with the number of doses administered."

DEFICIENCY DISEASES

AUFFRET, C. & TANGUY, F. Teneur en vitamine C des fruits et légumes d'A.O.F. [**Vitamin C Content of Fruit and Vegetables in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 1, 71–2.

The authors have determined the Vitamin C content of over 40 varieties of fruit and vegetables collected in different parts of French West Africa.

The results, given in mgm./100 gm. or mgm./100 cc. show a wide variation : for example, a number of peppers contained 100 to 250 mgm. per cent. ; pawpaws

up to 105; baobab to 180; groundnut leaves 150; mangoes 60 to 110; soursops 150 to 190; and fresh palm wine 145 mgm. per cent.

The list indicates that rational use of these sources of vitamin C, taking into account variations due to the season of harvesting and the nature of the soil, should provide the local Africans with sufficient of this vitamin to prevent deficiency.

They add that *Detarium senegalense* and *Bauhinia reticulata* contain respectively 2 and 1 gm. of vitamin C per cent.

H. J. O'D. Burke-Gaffney

ABBOTT, P. H. **A Survey of Signs of Nutritional Ill-Health among the Azande of the Southern Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Mar., v. 43, No. 5, 477–92. [16 refs.]

The diet of the Azande tribesman is described as follows :—

" The staple food is cassava, with eleusine and sweet potatoes as secondary staples. Groundnuts are by far the most important accessory food and, nutritionally speaking, the salvation of the diet in the extent to which they make good the shortcomings of cassava. Owing to the lack of livestock, animal products play a relatively small part, but termites make an appreciable contribution during a short season. Mangoes are eaten in very large numbers during the early rains; they and the leafy vegetables and sweet potatoes are, in turn, the main sources of vitamins A and C through the seasons."

The most important deficiency in this diet is of riboflavin. In weighed surveys covering many homes at different seasons of the year, average intake per head per day varied from 0·4 to 0·6 mgm., about one-third of recommended requirements.

Over 600 persons received a detailed clinical examination. The most important findings were :—

	Incidence per cent. of cases
Conjunctivae, thickened Grade I	61·9
,, ,, Grade II	15·0
Face, folliculosis	17·8
,, dyssebacia	33·6
Tongue, papillae hypertrophic	60·8
Clinical anaemia	24·4
Gums, swollen	15·3
,, gingivitis	26·5
Teeth, carious	15·8
Skin, permanent gooseflesh	32·3
,, " crackled skin "...	34·7
,, dry skin, Grade I	69·0

The author is cautious in ascribing any precise aetiology to these findings on account of the multiple nature both of the dietary deficiencies and the load of parasites supported.

This survey reveals the paucity of the diet of these tribes and the effect on their health and so is of fundamental importance to administrators, agriculturalists and the medical profession in the Southern Sudan. On these objective findings, plans for rural development in the future can be built up.

R. Passmore

PIÉRAERTS, G. Sur le syndrome dépigmentation oedème (Kwashiorkor) au Kasai (Congo Belge) et le moyen de le distinguer cliniquement des syndromes apparentés. [**The "Depigmentation Oedema Syndrome" (Kwashiorkor) in Kasai, Belgian Congo and its Differential Diagnosis.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 120–28.

The indigenous inhabitants of Kasai in the Belgian Congo bring to the doctor young children, usually from three to seven years of age, said to be suffering from "Diboba". This vernacular diagnosis includes,

1. Iron-deficiency anaemias (10 to 15 per cent. of cases).
2. Kwashiorkor (30 to 40 per cent. of cases).
3. Secondary anaemia, usually tuberculous (15 to 20 per cent. of cases).
4. Beriberi (2 to 5 per cent. of cases).
5. Combinations of the above.

This paper is a plea for accurate diagnosis, which is essential for all therapeutic trials. The author concludes that "kwashiorkor is a legitimate syndrome, very widely distributed and especially interesting now that it has become susceptible to treatment, but it is vain to believe that the diagnosis leaps to the eye and the practitioner who relies on the statements of the indigenous people is liable to grave errors". A detailed clinical description of the disease as it appears in the Belgian Congo is given. This does not appear to differ in any essentials from previous accounts from other parts of Africa. *R. Passmore*

ACHAR, S. T. **Nutritional Dystrophy among Children in Madras.** *Brit. Med. J.* 1950, Mar. 25, 701–3, 3 figs. [10 refs.]

This paper gives an account of 78 children investigated in the wards of Madras hospitals. The main clinical features were—

Oedema	78	(100%)
Dermatoses (crazy-pavement, denuded superficial layers, cracks and fissures at flexures, purpuric areas, depigmented or hyperpigmented areas, scaly skin of pellagra)	36	(47%)
Oral changes (cheilosis, angular stomatitis, glossitis)	35	(45%)
Eye changes (xerosis, keratomalacia, panophthalmitis, corneal opacity)	33	(42%)
Changes in hair (light hair; dry and brittle sparse hair)	40	(51%)
Palpable liver	48	(62%)
Diarrhoea	68	(87%)
Steatorrhoea	8	(10%)

The author points out that these are the signs of the condition described by workers in Africa and known variously as kwashiorkor, malignant malnutrition and infantile pellagra. He, in fact, leaves no doubt in the reader's mind that these children in Madras were suffering from a nutritional disorder similar in all important respects to the condition described by TROWELL, WILLIAMS and others in many parts of Africa. Nomenclature is discussed and each of the various names already suggested rejected and "nutritional dystrophy" put forward as the most descriptive term.

[The reviewer considers "nutritional dystrophy" altogether too vague a term. After many years of search, no words in the language of classical medicine descriptive of this syndrome have been found generally acceptable. Why not accept the name "kwashiorkor" and give it a place in our textbooks together with kala azar, beriberi and sprue? Even if, as in the case of sprue, the original meaning in the vernacular has become modified and expanded, no matter.

Language grows. We must learn both the new meaning of kwashiorkor, as descriptive of a clinical syndrome of wide geographical distribution, and also how to pronounce the strange word.] *R. Passmore*

HAEMATOLOGY

SNELL, F. M. **Observations on the Hematologic Values of the Japanese.** *Blood.* 1950, Jan., v. 5, No. 1, 89–100, 3 figs. [59 refs.]

In an investigation on the effect of irradiation on the Japanese survivors of Hiroshima, a series of controls was obtained from the neighbouring city of Kure. Blood samples of 935 persons of both sexes and all ages were examined. The haemoglobin and plasma protein was estimated by the copper-sulphate-specific-gravity method ; haematocrit readings were taken ; the total number of erythrocytes and leucocytes counted ; differential counts made by the usual methods, and the " cell constants ", mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC), were calculated.

For calculating means and standard errors, wide age groups were taken, 0 to 9, 10 to 14, 15 to 19, 20 to 39, and 40 years and over, and males and females considered separately. It was found that there were certain variations from the Caucasian " normals ".

The haemoglobin percentages and the erythrocyte counts of both males and females after puberty are less than the corresponding Caucasian normals ; the mean erythrocyte counts in the young male adult (20 to 39 years) is 4,804 millions per cmm. and at 40 and over shows a further slight decline to 4,562 millions. The haemoglobin percentage of the young adult (14·45 grammes per 100 ml.) similarly shows no significant increase after puberty. The means of the MCH and MCV values are slightly but definitely above the Caucasian normals, 30·17 and 30·67 $\gamma\gamma$ and 91·00 and 93·22 cu.μ, for the two adult age groups, respectively, with the MCHC correspondingly lower, about 32 per cent. for each age group against the usual normal of 34 per cent. Females showed a similar trend.

The leucocyte count is slightly higher than " normal " at all ages (total mean=9,903 per cmm.) and the eosinophil percentage is strikingly high (total mean=8·93). The plasma protein in all age groups is relatively high (total mean =7·59 grammes per 100 ml.).

In the discussion it is pointed out that the subjects were not necessarily healthy Japanese but were a cross-section of the community in which it was estimated that there was a two to three per cent. tuberculosis rate, an 80 to 90 per cent. *Ascaris* infection, and 50 to 60 per cent. ankylostomiasis rate. It was suggested that these infections would probably account for the increase in total leucocytes and the percentage of eosinophils and to some extent for the anaemia. It was thought that the low protein, especially animal protein, intake (estimated at 60 grammes with 90 per cent. of vegetable origin, daily) would account for the macrocytic hyperchromic tendency of the blood pictures. This left the slight hyperproteinaemia not well explained. Some possible factors—including a relatively high globulin content, the low fat content, and the unsuitability of the technique of estimation for the particular circumstances —that might account for the high figures are discussed. *L. E. Napier*

TEBBUTT, A. H. **Mediterranean (Cooley's) Anaemia in Australia.** *Med. J. Australia.* 1950, Jan. 14, v. 1, No. 2, 50–52.

A case of Cooley's anaemia, in a boy of 11½ years born in Australia of parents from a Mediterranean island, was recently reported by SINN [this *Bulletin*, 1949, v. 46, 966].

It has been shown, mainly by American workers, that the Cooley syndrome may be represented by examples varying from the fully developed erythroblastic anaemia, which is usually fatal at an early age, to a mild hypochromic anaemia with oval and target cells showing increased resistance to hypotonic saline. The trait is inherited as a mendelian dominant or partial dominant. When one parent has the trait, or a mild form of the disease, a mild form is likely to result, but when both parents have the trait a more severe form is likely to develop in one or more of their children.

Two cases are presented ; both are adults.

The first case was a woman of Lebanese parents, 30 to 40 years of age ; she had suffered from a treatment-resistant anaemia for at least four years. Red cells were 5,300,000 per cmm., haemoglobin 9·9 grammes per cent., mean corpuscular volume (M.C.V.) 63 cu.μ, mean corpuscular haemoglobin (M.C.H. 18 $\gamma\gamma$. The stained films showed many target and oval cells, microcytes and poikilocytes. The leucocytes were within normal limits. The red cells showed increased resistance to hypotonic saline, haemolysis commencing at 0·4 per cent. and being incomplete at 0·27 per cent.

The patient's father, aged 60, was in good health but showed a similar hypochromic microcytic (M.C.H.=20 $\gamma\gamma$, M.C.V.=67 cu.μ) blood pictures with a tendency to polycythaemia (6,400,000 red cells per cmm.) The smears showed slight anisoctyosis and poikilocytosis with oval cells and a few target cells.

The second case was that of a Greek, aged 54, who had splenomegaly and hepatomegaly for at least three years. His red cells were 3,900,000 per cmm., haemoglobin 8·6 grammes per cent., M.C.V. 69 cu.μ, M.C.H. 22 $\gamma\gamma$, leucocytes 28,000 per cmm. of which 82 per cent. were neutrophils without any " shift to the left ", 8 per cent. eosinophils, and 8 per cent. lymphocytes. There were many oval cells and target cells in the blood smears. There was a decrease in red cell fragility. There was an increase in reticulocytes and platelets.

The author considers that the diagnosis in the second case is less certain than in the first and that the second may be a case of mild oval-target-cell anaemia (Cooley) complicated by some other blood dyscrasia. *L. E. Napier*

RAPER, A. B. **Sickle-Cell Disease in Africa and America—a Comparison.** *J. Trop. Med. & Hyg.* 1950, Mar., v. 53, No. 3, 49–53. [43 refs.]

The author has previously stated that the sickling aberration is a more important cause of morbidity among Negroes in the United States than in Africa.

In medical literature there are only " about 33 " references to sickle-cell disease from African sources (the author gives 32 of these in a bibliography), whereas the American literature is voluminous.

In the United States the incidence of the sickling trait is about seven per cent. of the whole Negro population ; that is, a total of 900,000 persons are affected. It is fairly constant in different parts of the country. In Africa, on the other hand, the incidence of the trait varies in different ethnological groups, but is usually between 12 and 27 per cent. of the population. In Uganda, the Hamitic peoples show only 2·9 per cent. compared with 19 per cent. and 27 per cent. in the Bantu and Nilotic tribes, and 46 per cent. for the " pigmoids ". The author considers that the available figures indicate an incidence of about 20 per cent. in Africa south of the Sahara, including the West Coast, that is, about three times the incidence in the United States.

Sickle-cell anaemia, however, is apparently rare in Africa. Much confusion has arisen through any anaemia in a subject with sicklaemia being diagnosed as sickle-cell anaemia. It is not sufficient for the anaemia to be of a chronic or recurrent haemolytic type; it is also necessary that the effect of parasitic infections should be excluded and that there should be no permanent response to treatment. It is furthermore desirable that *in vivo* sickling should be demonstrated. In most of the 106 reported cases of sickle-cell anaemia in Africa insufficient data have been given to satisfy these criteria, and in many cases it seems almost certain that the cases were not true sickle-cell anaemia, *e.g.*, TROWELL [this *Bulletin*, 1945, v. 42, 825] reported 21 cases of this anaemia in a series of 100 cases of anaemia.

Many other writers emphasize the rarity of true sickle-cell anaemia, and the author estimates that less than one in a thousand persons in Africa with the trait develop sickle-cell anaemia, as compared with one in fifty in America.

In discussing the reasons for the lower incidence of sicklaemia and the higher incidence of sickle-cell anaemia among American Negroes, the author suggests that, among the daughter community (the American Negro), it is possibly the dilution by inter-marriage which might account for the lower incidence of the trait, and that it is some factor imparted by inter-marriage with the white race that brings out the haemolytic character.

He finally suggests that, although sickle-cell trait is not important to the African, it is to the American Negro, and that a study of the trait in Africa might throw more light on its genetics. *L. E. Napier*

PARENT, J. **Sickle Cell Anemia.** *Ann. Soc. Belge de Méd. Trop.* 1950, Mar. 31, v. 30, No. 1, 47–52, 1 fig. on pl.

The following is a translation of the author's summary :—

Sickle-cell anaemia, characteristic of the coloured races and well recognized in the United States, has not so far been recorded in the Belgian Congo.

After reviewing briefly the clinical features of sickle-cell anaemia and the essential differences between this condition and the sickle-cell trait, the author describes two cases of sickle-cell anaemia in African children.

H. J. O'D. Burke-Gaffney

VENOMS AND ANTIVENENES

PIFANO C., F. & RÖMER, M. Ofidios ponzoñosos de Venezuela. 1. Nueva comprobación en Venezuela del *Bothrops medusa* (Sternfeld, 1920) Amaral, 1929 y redescripción de la especie. [**Poisonous Snakes of Venezuela. I. New Confirmation of** *Bothrops medusa* **(Sternfeld, 1920) Amaral, 1929 and Redescription of the Species.**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 277–300, 5 figs.

PIFANO C., F. & RÖMER, M. Ofidios ponzoñosos de Venezuela. II. Sobre las serpientes ponzoñosas Venezolanas del grupo *Bothrops lansbergii*. [**Poisonous Snakes of Venezuela. II. Poisonous Snakes of the Group** *Bothrops lansbergii*.] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1949, Oct., v. 1, No. 2, 301–26, 6 figs. English summary.

STAHNKE, H. L. **The Arizona Scorpion Problem.** *Arizona Med.* 1950, Mar., v. 7, No. 3, 23–9.

[An interesting article treating of scorpionism in Arizona.] It is estimated that some 2,500 persons annually are stung by scorpions in Arizona, for 1,553

were reported as receiving treatment in ten months and many instances never come to the doctors' cognizance. There are several species of scorpions in the State, but two only, *Centruroides sculpturatus* and *C. gertschi*, are lethal and many parts of the State are free from these two. The symptoms produced are a tingling and burning pain spreading from the site of puncture, then marked restlessness, tonic and fibrillary spasms of the muscles, later convulsions with opisthotonus and prosthotonus, twisting of the trunk, abdominal cramps and pharyngeal spasm; in some cases there is temporary blindness for 6–8 hours, drooling of saliva and unconsciousness preceding death. *Post mortem*, the viscera are seen to be congested and the lungs show punctate haemorrhages. If recovery takes place the local hypersensitiveness may persist for 7–10 days after the other symptoms have cleared up.

The *Centruroides*—the lethal scorpions—are often called "bark scorpions" because they lurk in the loose bark of trees; the non-lethal are "ground scorpions" and live in sand or under objects on the ground and only accidentally are found in dwellings. These latter cause severe local pain and swelling. It is a curious fact that though fatal cases occur in each of the first eight months of the year and in October, none has been recorded in the past 20 years in the month of September. Laboratory animals inoculated with the venom of *C. sculpturatus* die more quickly if adrenaline chloride is administered. Preparation of antivenene is difficult because the postal authorities refuse to allow live scorpions to be sent to the laboratory. Treatment of scorpion sting is summed up in localization of the venom by the application of a tourniquet and cryotherapy by ethyl chloride or crushed ice in water. The tourniquet is removed after a few minutes but the hand or foot, as the case may be, is left in the iced water for two hours; at the same time sedatives, as sodium pentothal or phenobarbitone, are prescribed.

In control and eradication of scorpions the following is recommended: Chlordane 2 per cent., DDT 10 per cent., pyrethrum 0·2 per cent. in purified kerosene, sprayed like a paint, not as a "Flit spray" or fog-producing spray. The oil base evaporates and leaves the toxicant, and the residue is not strong enough to harm children or animals. *H. Harold Scott*

DERMATOLOGY AND FUNGUS DISEASES

MAZZOTTI, L. & OLARTE, J. Acción de la aureomycina en el mal del pinto. [**Action of Aureomycin on Pinta.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Sept., v. 10, No. 3, 219–21.

The English summary appended to the paper is as follows:—

"The oral administration of Aureomycin in two patients of "Mal del pinto" ("carate"), produced the disappearance of *Treponema carateum* from the interstitial fluid obtained by pressure of the skin after excoriation of the epidermis.

"Further observations in these and other patients may show if this drug has some practical value in the treatment of this treponematosis."

CHAMPEAU, M. F. Notes préliminaires sur les mycétomes d'Afrique occidentale française. [**Preliminary Notes on the Mycetomas of French West Africa.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 1/2, 80–84, 4 figs. on 2 pls.

Mycetoma is common amongst indigenous agriculturists in Northern Senegal and Western Mauritania, especially in a quadrilateral area bounded on the

west by the Atlantic coast, on the south by a line from Louga to Matam crossing the desert of Ferlo, on the east by a line from Matam to Tidjikdja and on the north from Tidjikdja to Nouakchott. In this area the soil varies from sand to clay according to the district, and thorny shrubs and mimosas abound. The climate is hot and dry for six to eight months of the year, the night temperature ranging from 15° to 18°C. and the day temperature from 45° to 60°C. according to the particular region. The total humidity would be between 12 and 30 per cent. In the wet season, which occupies much of the remaining four to six months, the temperature is about 30° to 37°C. and the humidity reaches 60 to 80 per cent.

An account is given of the various indigenous people (who include negroes, Moors, and some of ancient Egyptian origin), and of their occupations as shepherds, fishermen and agriculturists. Mycetoma is a disease of the agriculturists, who are chiefly of the negro race. Infection takes place during the wet season when the fields are being tilled for the cultivation of millet, maize, groundnuts and yams. The clinical history of the disease is unvarying and commences with the infliction of a deep wound, caused usually by a kind of angular hoe used in tillage, into which soil rich in decayed vegetable matter is introduced. The wound is subjected to crude self-treatment which may have the effect of causing secondary infections. After about three to six months, the unhealed injury becomes swollen and sinuses appear, discharing intermittently. At this stage the disease causes much suffering and the patient seeks the aid of a quack doctor or a holy man and he is treated with a combination of crude surgery and magic (described by the author), which aggravates the condition. The next step is a visit to a dispensary where a native doctor applies ineffective treatment with salts of iodine and the heavy metals. Finally the victim presents himself at the Colonial Hospital, where the affected foot is amputated. If amputation is refused the patient usually dies in five to ten years from some intercurrent disease, frequently pneumonia or tuberculosis.

The commonest form of mycetoma encountered is that with black grains, but the red and white-grain varieties are also frequent.

The description of the disease, its mycology and histo-pathology is reserved for a future report. *J. T. Duncan*

GREEN, R. & MANKIKAR, D. S. **Trichosporosis (Piedra) in Malaya.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Mar., v. 43, No. 5, 523–6, 12 figs. on 2 pls. [10 refs.]

The authors describe an instance of the black type of piedra in Malaya. The patient was a male European who had been in the country three years. The piedra nodules were found only on hairs in the front and right side of the scalp where the hair brush was most frequently used, and significance is also attached to the application of a mucilaginous hair fixative. Cure was effected by cutting the hair, washing the scalp with soap containing 1 per cent. mercuric iodide, applying a lotion containing salicylic acid (2 per cent.) and chloretone (5 per cent.) and discontinuing the use of the mucilaginous hair fixative.

The structure of the parasitic nodule is well shown by photomicrographs, but the textual description of the nodule and the fungus is meagre. The spores seen in the nodule (not the ascospores) measured from 2·2 μ to 8·0 μ with an average of 4 or 5 μ for different specimens. When the nodules were kept in humid surroundings, asci measuring about 30 μ in diameter and containing eight elongated ascospores became apparent in their interior. The fungus of Malayan black piedra, as seen in the parasitic nodule, closely resembles *Piedraia hortai*, the principal parasite of American black piedra, but the spores (not the

ascospores) of the Malayan fungus are only about half the size of those seen in the nodules of *Piedraia hortai*. An earlier report by LAMPE [this *Bulletin*, 1941, v. 38, 94] on black piedra in the Netherlands East Indies gave spore measurements similar to those of the Malayan fungus. For this reason the authors consider the Malayan fungus to be a species of *Piedraia* different from *P. hortai* and they propose for it the name *Piedraia malayi* n.sp. A Latin diagnosis is not given, nor any characters except those mentioned.

Photomicrographs show early vegetation of the fungus from a nodule in culture but no description of the culture is given. *J. T. Duncan*

KELLY, Ruby G. & WOODRUFF, C. E. **Sensitivity to Histoplasmin.** [Correspondence.] *Amer. Rev. Tuberculosis.* 1950, Feb., v. 61, No. 2, 269.

In 1946, the authors tested 471 patients in a sanatorium in Michigan for sensitivity to histoplasmin (0·1 ml. of 1/1000 dilution). Of these 54 patients gave positive reaction within 48 hours.

A table shows that 10 of the reactions occurred among 40 patients born in Central Europe (25 per cent.) while only 10·2 per cent. of 431 patients not born in Central Europe were positive. It is added that offspring born in Detroit of these patients from Central Europe showed only the average incidence of the positive reaction. *H. J. O'D. Burke-Gaffney*

LIMA, A. O. & GUIMARÃES, N. O problema da histoplasmose benigna. [**The Problem of Benign Histoplasmosis.**] *Hospital.* Rio de Janeiro. 1949, Dec., v. 36, No. 6, 939–46. [36 refs.]

EMMONS, C. W. **Histoplasmosis : Animal Reservoirs and other Sources in Nature of the Pathogenic Fungus,** *Histoplasma. Amer. J. Pub. Health.* 1950, Apr., v. 40, No. 4, 436–40. [16 refs.]

"*H. capsulatum* has been isolated in culture in our investigations from 5 dogs, 1 house mouse, 47 brown rats, 4 roof rats, 19 domestic cats, 7 spotted skunks, and 1 opossum, and from 6 soil samples collected on farms where rats with naturally acquired histoplasmosis have been captured previously.

The significance of these observations is not fully apparent but the examination of cats and rats by preparation of cultures is recommended as a method of determining the geographic distribution of histoplasmosis."

JONCHÈRE, H. & MARTIN, M. Blastomycose viscérale mortelle observée à Dakar. [**Fatal Visceral Blastomycosis observed in Dakar.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 1, 103–8. [10 refs.]

An African soldier aged about 25 years, from Casamance, presented himself at a hospital in Dakar on 25th January, 1949, suffering from marked hepatomegaly. The liver was enlarged 18 cm. downwards in the mammary line, it was painful on palpation, its surface was smooth and its anterior border regular and without nodules. The spleen was palpable and there were slightly enlarged lymph nodes in the cervical and inguinal regions. The skin and the respiratory system showed no abnormality. A tentative diagnosis of amoebic hepatitis was made and emetine treatment was instituted. Twenty-one days after admission to hospital the patient became comatose and died. At autopsy the liver was found to weigh about 5 kilogrammes. Its parenchyma had a finely granular appearance, the granules, about the size of a pin's head, were yellow against the dark red background of the congested liver tissue. The hepatic lymph nodes were enlarged to the size of an almond. Histologically, the granules were seen to be granulomata of macrophage and giant cells filled

with oval, thick-walled fungal cells which measured from 8 to 12 μ in longer diameter. The portal spaces and parenchyma were extensively invaded and the architecture of the liver was destroyed. A culture of the fungus was not obtained and the authors were in doubt as to its identity. It agreed closely with a fungus found in two other cases, one, an ulcerating granulomatous lesion of the skin of the cheek and the other a pulmonary disorder with copious sputum in which the fungus was seen. Comparison was also made with two cases of African histoplasmosis caused by the large form of *Histoplasma capsulatum* but the authors consider that their case and the two caused by a morphologically similar fungus belong to the "*grande famille des Blastomycoses*", which would not necessarily imply that they were cases of Gilchrist's disease.

J. T. Duncan

BOGLIOLO, L. **South American Blastomycosis (Lutz's Disease). A Contribution to Knowledge of its Pathogenesis.** *Arch. Dermat. & Syph.* 1950, Mar., v. 61, No. 3, 470–74, 2 figs.

Dental sockets or lesions of the gums may prove an important portal of infection in South American blastomycosis. This possibility was illustrated in a previous paper by the present author, referred to by ALEIXO and FURTADO [this *Bulletin*, 1949, v. 46, 283] who added five other instances of infection by *Paracoccidioides brasiliensis* through the dental route. In the present paper two more examples are furnished.

The first of these was a male Brazilian aged 55 living at Belo Horizonte who suffered from an alveolar affection evidenced by pyorrhoea. After extensive dental extractions the gum wounds failed to heal and an ulcerative process set in and spread to the cheeks and lips. When seen ten months later, there were shallow ulcers with granular bases on the gums and labial mucosa which were typical of the blastomycotic granuloma. The submaxillary lymph nodes were involved and an X-ray examination of the chest showed miliary nodules in both lungs, most numerous in the upper lobes. The diagnosis of *P. brasiliensis* infection was made by microscopy and cultivation of the fungus from the mouth lesions. A further dental extraction was made and from an apical granuloma on a premolar tooth the fungus was isolated. Histological examination showed that the tooth was not infected but in the periodontal tissue and the non-ulcerated gum margin there were small but typical mycotic granulomata containing *P. brasiliensis*.

The second patient was a male Brazilian aged 22 also living in Belo Horizonte, who suffered from the glandular type of Lutz's disease involving the various groups of cervical and inguinal lymph nodes, some of which had broken down and suppurated. There were many carious teeth and the extracted second left lower molar was found to have an apical granuloma. From this granuloma and from the lymph nodes *P. brasiliensis* was isolated. An otorhinolaryngoscopic examination showed nothing abnormal except the carious teeth and an X-ray examination of the chest gave a normal picture.

The author stresses the importance of making a mycological examination in connexion with dental operations for alveolar pyorrhoea or periodontitis (apical granuloma).

J. T. Duncan

PIERS, F. **Plant Dermatitis due to *Montanoa bipinnatifida*. With a Botanical Note** by P. R. O. BALLY. *East African Med. J.* 1950, Feb., v. 27, No. 2, 99–101, 1 fig.

TROPICAL OPHTHALMOLOGY

DE OCAMPO, G. **Some Ophthalmological Misconceptions in Medical Practice in the Philippines.** *J. Philippine Med. Ass.* 1949, Nov., v. 25, No. 11, 545–53. [14 refs.]

Some ophthalmological misconceptions in medical practice in the Philippines are discussed by de Ocampo. He advocates the intracapsular extraction of cataract and says that a patient should not be kept waiting for the cataract to become fully mature before it is extracted. He points out that old age (over 75 years), diabetes and hypertension are not contra-indications to cataract extraction if proper precautions are taken. Trachoma is rare amongst Filipinos and in the Philippines the disease occurs mostly among Chinese, Hindus and Indo-Chinese. Follicular conjunctivitis is common among Filipino children and should not be mistaken for trachoma. Kerato-conjunctivitis of virus origin occurs in endemic form with occasional epidemics. Glaucoma is the most frequent cause of incurable blindness and there should be a widespread concern for this disease. Opticians, medical practitioners and the public should be made aware of the dangers of this disease.

Squint should be treated, and if necessary operation should be carried out during the pre-school age in order to avoid amblyopia. The author points out that in the treatment of eye strain, refraction and the wearing of glasses are not the only things to be considered. The proper use of the eyes, provision of good lighting, elimination of glare and improvement of the general health are also of great importance. *E. O'G. Kirwan*

CRAWFORD, H. E. & HAMMAN, Grace C. **Racial Analysis of Ocular Defects in the Schools of Hawaii.** *Hawaii Med. J.* 1949, Nov.–Dec., v. 9, No. 2, 90–93, 1 chart.

The race groups analysed in this study consist of Hawaiian, part Hawaiian, Portuguese, Porto Rican, Spanish, other Caucasian, Chinese, Japanese, Korean, and Filipino. The statistics compiled indicate an increase in refractive errors with age. There is a high incidence of myopia in the Oriental races, particularly the Chinese. Strabismus appears to be relatively rare. Pterygium is common and occasionally malignant disease is found. Interstitial keratitis is remarkably uncommon. Retinitis pigmentosa is not uncommonly found in the older age groups. There is no significant racial difference in the percentage of ocular diseases. *E. O'G. Kirwan*

CHANG, L. W. **Blindness among the Chinese. A Statistical Study of 2,000 Cases in the Eye Departments of Northwestern Hospital, Sian, and Central Hospital, Chungking.** *Chinese Med. J.* Shanghai. 1949, Mar., v. 67, No. 3, 169–70.

A statistical study of 2,000 blind persons in the Eye Department of North Western Hospital, Sian, and Central Hospital, Chungking was made by Chang.

Among 103,139 patients seen in the hospital there were 14,982 eye patients. Of these eye cases, 1,037 were blind in one eye, 963 in both eyes. Males preponderated over females in a ratio of three to one. The ages varied from infancy to 80 years but most were between 20 and 40 years. The most important causes of blindness were infections of the conjunctiva and cornea (90·3 per cent.) and in these trachoma was the commonest cause. *E. O'G. Kirwan*

PEARSON, G. H. **Trachoma, a Review of Recent Literature.** *Chinese Med. J.* Shanghai. 1949, Mar., v. 67, No. 3, 171–6.

Recent literature on trachoma is reviewed for the benefit of doctors mostly in China. The information is derived from the publication "*La Revue Internationale du Trachome*", New Series, No. 1, published in Paris by the "International Organization against Trachoma". It is a revival of the pre-war publication of the same name and contains articles from authors all over the world who are dealing with the disease.

ROSTKOWSKI of Warsaw states that it is incontestable that the trachoma patient is a source of infection to others. A transfer of wet secretion from the eyes seems to carry the infection and it may be carried on the hands, gloves, handkerchiefs, bedding, etc. The secretion seems to lose its infectivity when it is dried. Conjunctival catarrh facilitates the contagion of trachoma and the untreated case is much more infective than one under treatment. A prolonged contact and lack of resistance on the part of the patient are definite factors in causing infection. Many adults possess an acquired resistance to trachoma but infants and children seem predisposed to the disease and are easily infected: new cases among adults are very rare.

The authorities quoted by the author all stress the importance of efficient local treatment and the fact that this treatment should be as painless as possible.

TOULANT of Algiers writes that there is no specific cure for trachoma. Sulphonamides are useful but it is impossible to cure trachoma without local treatment. The old-fashioned caustic solutions damage the cornea and should be abolished. Excessive curetting of the diseased tissue should be avoided. General treatment of the whole patient is very important. Penicillin was found to be of little use.

DELANOE of Morocco advocates the use of chaulmoogra oil for actual rubbing of the diseased conjunctiva. In resistant cases she advocates a cautery or scarification with the Graefe knife.

MARKS of Brisbane prefers lavage with a mild antiseptic solution, *e.g.*, zinc sulphate, together with cleanliness and general care. He finds that the sulphonamides are only of use in the secondary infection. He points out the important part played by houseflies in conveying infection.

MOURZINE of Kazan, U.S.S.R. advocates mechanical treatment on a large scale by repeated expressions of the granules together with local treatment in the intervals. Ten days should elapse between each expression which should never be done during an attack of conjunctivitis. Sulphonamide treatment is used in combination with expression of the granules. Autohaemotherapy and lactotherapy have also proved useful. For children, where a painless treatment is essential, the sulphonamides are often the treatment of choice. The new antibiotics, penicillin, etc., as local applications are effective for secondary infections and may replace many of the older drops or ointments.

FILATOFF in 1936 applied "tissue therapy" in the treatment of trachoma.

This is the transplantation or implantation of tissue preserved over a period at a low temperature and in the dark. Tissues such as conjunctiva and placenta have been used. It has proved efficacious, especially in pannus.

More recently he has made use of vegetable tissue preserved in the same way. The treatment begins with an expression of the granules and the injection of 1 cc. of extract of aloes subcutaneously. A course consists of 25 to 40 injections, two daily. Aloes injections are sometimes given subconjunctivally as well.

Victoria VIRGILIO of Buenos Aires prefers a mixed method of sulphonamides plus local treatment.

The views of a number of other authorities are given and the author closes with a description of the treatment routine in the clinic at Shaoyang in Hunan, which follows accepted lines and embodies a number of the principles outlined above. *E. O'G. Kirwan*

BLANC, G., BRUNEAU, J. & PAGÈS, R. Pouvoir pathogène de quelques spirochètes sanguicoles pour l'oeil du lapin. [**Pathogenic Power of certain Blood Spirochaetes for the Rabbit's Eye.**] *Bull. Acad. Nat. Méd.* 1949, v. 133, Nos. 31/32, 600–605, 2 figs.

The ocular manifestations of relapsing fever in man are not rare, occurring in 20–32 per cent. of cases according to different authorities. These are simple iritis, iridocyclitis and very rarely choroiditis. One eye is more often affected. The cornea is never involved. The ocular symptoms appear slowly, more often when the fever has disappeared and spirochaetes are absent from the blood.

In their experiments on rabbits, the authors utilized three types of spirochaetes, *viz.*, *Sp. hispanica*, *Sp. duttoni* and *Sp. merionesi*.

The inoculations were made into the anterior chamber of the eye after withdrawal of a few drops of aqueous humour ; the best results were obtained if the cornea was lightly scraped before giving the injection. Those inoculated with *Sp. hispanica* showed spirochaetes in the blood ; this also occurred with *Sp. merionesi*, but the spirochaetes were less numerous. In the cases inoculated with *Sp. duttoni* no spirochaetes were found in the blood. All the rabbits injected did not necessarily have ocular reactions. They were more frequent and more severe with *Sp. hispanica* than with *Sp. merionesi* and *Sp. duttoni*. Twenty-four hours after inoculation there was conjunctivitis with chemosis and circumcorneal injection ; later the conjunctivitis became more intense and spirochaetes were sometimes found in the discharge. After two or three days, iridocyclitis and keratitis appeared and a fibrinous deposit could be seen in the anterior chamber. Iritis with occlusion and seclusion sometimes occurred. The ocular signs persisted for 2–3 weeks according to their intensity and then the cornea cleared and the iris returned to normal, leaving residual synechiae.

The severest reactions occurred with *Sp. hispanica* : intense iridocyclitis, deep keratitis and severe conjunctivitis. Those due to *Sp. merionesi* and *Sp. duttoni* were much less marked and their duration much shorter. The keratitis produced by *Sp. hispanica* closely resembles the keratitis caused by syphilis. Inoculation of spirochaetes by the subcutaneous, peritoneal or venous channels did not cause lesions of the cornea. *E. O'G. Kirwan*

GARCIN, G. & FERRAND, J. Les complications oculaires de la fièvre récurrente à tiques dakaroise. [**The Ocular Complications of Tick-borne Relapsing Fever at Dakar.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 297–305.

The ocular complications of relapsing fever in Dakar are discussed by Garcin and Ferrand. Their results are founded on the examination of fourteen cases in two groups of seven each. The first group of seven cases was observed in the period 1944–1945 and the results already published [this *Bulletin*, 1947, v. 44, 617]. All these were coloured patients. The ocular manifestations came on some time after the onset of fever and consisted of a uveitis affecting the vitreous or iris or both. Fine opacities appeared in the vitreous and the iritis was of a mild type. In one case the optic nerve was affected, causing optic atrophy. This was probably due to the treatment with arsenical drugs rather than to the disease itself.

The second group of seven cases was observed during the years 1946–1947. The results observed resembled largely those in the first group, but, curious to relate, all occurred in white patients. No ocular complications were noticed among Africans during this period. The explanation of this is probably one of diagnosis : the ocular complications are so mild that only European patients were examined by ophthalmic specialists. In two of these cases a unilateral facial paralysis occurred. This, like the uveitis, cleared up and left no sequelae. In one case the optic nerve was involved and it was uncertain whether the cause of this was due to the disease itself or to pentavalent arsenical preparation given in treatment. *E. O'G. Kirwan*

GIBSON, J. B. G. **Eye Complications of Leprosy.** *Med. J. Australia.* 1950, Jan. 7, v. 1, No. 1, 8–11, 4 figs.

The author, over a period of 6 years, found ocular complications in 34 out of 55 patients with leprosy in Queensland, Australia, which is situated within the tropical zone. In the series there were 17 women and 38 men. The ages ranged from 18 to 84 years. The frequency and severity of the ocular lesions depended upon the duration and severity of the disease itself and were more severe in the nodular and mixed types. The cornea was the tissue most affected and the commonest lesion was the superficial punctate keratitis which is pathognomonic of leprosy. A diffuse yellow coloration of previously white sclerotics—" yellow eye " was observed and was followed later by acute plastic iritis.

The sulphonamides and penicillin had no effect upon the ocular lesions. Lactoflavin, given intramuscularly, proved of some value in the treatment of superficial punctate keratitis by leprosy.

The author points out the importance of keeping the pupils dilated by mydriatics if they do not react to light, as the greatest danger to sight is occlusion of the pupils by plastic iritis. Whatever immediate results are obtained by various ocular treatments, the ultimate condition of the patients' eyes depends largely upon whether or not the disease itself is arrested.

E. O'G. Kirwan

CHANG, E. **Uveitis of a Cantonese caused by** *Gnathostoma spinigerum* **(Owen 1836). Report of a Case.** *Chinese Med. J.* Shanghai. 1949, Mar., v. 67, No. 3, 166–8, 2 figs.

Gnathostoma spinigerum is a nematode normally found parasitic in cats and dogs. Man is an unnatural host in whom the worm does not grow beyond the immature stage. In the thirteen cases of human gnathostomiasis reported in the literature, the worms found were, except in one instance, all immature forms. This is the first reported case with the worm in the eye causing uveitis. For four months the patient suffered from a series of troubles in the left eye. They started with a corneal ulcer, followed by iritis and finally by severe uveitis and secondary glaucoma with the worm seen in the anterior chamber. The eye improved after extraction of the worm and the vision returned to 6/18. The infection occurs in man by eating inadequately cooked infected fish, the secondary intermediate host of the worm. The absence of eosinophilia in the blood and the absence of other signs in the body seems to indicate that the infection in this case was localized only in the eye. [See also this *Bulletin*, 1949, v. 46, 1069, 1070.] *E. O'G. Kirwan*

TROPICAL ULCER

WU, Chia-chu, CHIAN, Tu-lai & WAN, Chi-yuean. **The Study on the Cause of Tropical Ulcer. Report 3.** *J. Formosan Med. Ass.* 1949, Oct., v. 48, Nos. 9/10, 270–73, 4 figs. [10 refs.]

The authors, in the Far East, report on 79 more cases of tropical ulcer from 60 of which they cultivated the anaerobic diplococcus already reported by MAGARA *et al.* [this *Bulletin*, 1949, v. 46, 782], to which they had tentatively given the name of *Diplococcus tropicus.*

Some additional details are given, but the paper largely follows the lines of the paper quoted above. *H. J. O'D. Burke-Gaffney*

ARMALEO, G. L'autoemoterapia topica nell'ulcera tropicale. [**Local Autohaemotherapy in Tropical Ulcer.**] *Arch. Ital. Sci. Med. Colon. e Parasit.* 1949, Dec., v. 30, Nos. 11/12, 195–8. English summary (3 lines).

The author has seen a large number of cases of tropical ulcer in Abyssinia and Somalia and in general has been disappointed with the results of the usual forms of treatment. He has, therefore, tried the effect of local application of the patient's own blood. He draws blood from a vein in the arm, " sufficient to cover the site of the ulcer ". After cleaning the ulcer with physiological saline or weak antiseptic and carefully drying the base and edges with sterile gauze, he waits until the blood is beginning to clot, then applies it to the ulcer and covers the whole with a light bandage. Re-application is made at different intervals according to the appearance of the ulcer and the adhesion of the coagulum to the tissue beneath, but in 15–20 days some 80 per cent. of the ulcers were cured. Naturally, the length of time will depend on the size of the ulcer and on any underlying infection or disease, such as syphilis, ankylostomiasis, avitaminosis, or malaria. *H. Harold Scott*

See also p. 631, AMPOFO & FINDLAY, **Aureomycin in the Treatment of Yaws and Tropical Ulcer in Africa.**

MISCELLANEOUS DISEASES

LAMBILLON, J. La gastrite tropicale et son traitement par la désoxycorticostérone. [**Tropical Gastritis and its Treatment by Desoxycorticosterone.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 567–72.

The author describes a gastric syndrome met with in Europeans living in the tropics and considers that he can describe it as tropical gastritis. In the treatment of this complaint he has used with remarkable success acetate of desoxycorticosterone in oily solution and in a microcrystalline solution (suspension). This treatment is well tolerated and causes no disagreeable manifestations. The symptoms are usually relieved by alkalis or administration of milk.

Commencement is made with a daily dose of 30 mgm. intramuscularly of desoxycorticosterone in oily solution, the dose being repeated for six consecutive days. Afterwards six more injections of the drug in a dosage of 20 mgm. are given every second day. When the last oil solution is given the patient also receives an ampoule of 50 mgm. of a microcrystalline suspension of the same drug, this being designed to prolong the effect of the treatment. The dose of 50 mgm. is repeated after 10 days, 15 days, 3 weeks and one month as necessary.

In certain cases there is a resemblance to gastric or duodenal ulcer. A remarkable fact is that all the symptoms usually rapidly disappear when the patient goes on leave to Europe, but the signs may reappear progressively on his return to the Tropics. Five cases are described in detail.

C. F. Shelton

ROGOWSKY, M. A propos d'un nouveau cas d'Angiomatose de Kaposi chez un Noir du Congo Belge. [**A New Case of Kaposi's Angiomatosis in an African in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1949, Dec. 31, v. 29, No. 4, 579–81, 2 pls.

JONCHÈRE, H. Contribution à l'étude du cancer en Afrique Occidentale Française. [**Cancer in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1948, v. 5, No. 2, 247–53. [13 refs.] [Summary appears also in *Bulletin of Hygiene.*]

This paper is based on the results of microscopical examination of 713 malignant tumours in the Pathological Institute at Dakar. Ninety-eight were in Europeans and whereas cases of cancer of the breast and uterus constituted half the total number of cases of carcinoma, those of the stomach formed only 5 per cent. instead of the 43 per cent. expected in Europe [in England and Wales cancer of the stomach accounts for 22·5 per cent. of all male and 16·6 per cent. of all female deaths from cancer]. This was due to the comparative youth of the patients and to the fact that those in whom this diagnosis was suspected were sent back to Europe for treatment.

Six hundred and fifteen tumours were in Africans, 69 per cent. of which were carcinoma and 19·5 per cent. sarcoma, or 3·5 to one, as against 15 or 20 to one in Europe. Epithelioma of the skin appeared at a relatively earlier age in Africans than in Europeans and was more common on the lower limbs in association with phagedaenic ulcers, the treatment of which by irritating native medicaments had doubtless predisposed them to malignant change. Basal-cell carcinoma on the other hand occurred at the same age and in the same situations as in Europeans. Only five cases of carcinoma of the bladder were met with, in four of which ova of *Schistosoma* were demonstrated in the cancerous tissue. Cancer of the breast accounted for only 6 per cent. Primary cancer of the liver was diagnosed in 23 per cent. of all cases of cancer in Africans; there were two types: (*a*) encephaloid, the growth having developed very rapidly in patients of 15 to 25 years of age, almost all of whom were males; (*b*) adenocarcinoma, the more common type, which developed less rapidly in rather older patients. In the majority of patients the cancer appeared to be grafted on a long-standing cirrhosis and to have been preceded by numerous attacks of hepatitis. There were 121 sarcomas, including 15 cases of Hodgkin's disease and 43 of lympho- or reticulo-sarcoma, a high frequency for which the usual explanations are advanced—shorter life span of Africans, greater frequency of trauma and chronic irritation, and comparative ease of diagnosis. There were 19 melanomas, all but four in the lower limbs, 21 tumours of the nervous system, 17 of which affected the cutaneous nerves, and 31 teratomas. There was only one tumour of the brain.

[The incidence of primary cancer of the liver is estimated at 0·5 to 1·1 per cent. of all cancers in Western Europeans. It is known that its incidence is much higher in Africans and Orientals. BERMAN [this *Bulletin*, 1941, v. 38, 540; 1942, v. 39, 488] from a study of available data found that it formed 37·4 per cent. of all cancers recorded in the Bantu of the East and South Africa and 18·7 per cent. of all cancers in West African negroes. He states that there is a zone of high incidence extending from W. Africa across S. and

E. Africa to Sumatra, Java, the Philippines, China and Japan. It is associated with a high incidence of cirrhosis of the liver (73 per cent. in E. Africa) and is pre-eminently an affection of young adult males. KENNAWAY [*ibid.* 1945, v. 42, 150] showed by analysis of mortality statistics that there is no definite indication of greater liability among the negroes in the U.S.A. than among the white population, so the cause does not lie in racial susceptibility, but must be due to an extrinsic factor. Intestinal parasites, schistosomiasis, and distomiasis have been found in association with cancer of the liver, but these factors hardly seem sufficient to account for the high incidence in Africans, which is borne out by the figures quoted from this paper, and the cause of which awaits further research.] *W. L. Harnett*

MARSDEN, A. T. H. **The Clinical Characteristics of some Common Malignant Tumours.** *Med. J. Malaya.* 1949, Dec., v. 4, No. 2, 117–30.

An interesting résumé of the subject.

GONZALEZ PERIS, G., FERNANDEZ BAQUERO, G. & FORNOS PALENCIA, P. Ainhum: dos nuevos casos Cubanos. [**Two New Cases of Ainhum in Cuba.**] *Archivos Hospital Universitario.* 1949, Nov.–Dec., v. 1, No. 6, 619–28, 4 figs. on 2 pls. [22 refs.] English summary.

BEHRENS, W. Ein Fall von sog. Pulmonary Eosinophilosis, bzw. Tropical Eosinophilic Asthma. [**A Case of so-called Pulmonary Eosinophilia.**] *Schweiz. med. Woch.* 1950, Mar. 11, v. 80, No. 10, 258–9.

A case in an Indian from Ceylon.

PROTOZOOLOGY: GENERAL

HUTCHISON, J. H. **Congenital Toxoplasmosis: a Report of Two Cases.** *Arch. Dis. in Childhood.* 1949, Dec., v. 24, No. 120, 303–8, 2 figs. [37 refs.]

Two probable cases of toxoplasmosis are reported from Scotland. The first was a girl a year old who had squints in both eyes from birth. She was admitted to hospital with pneumococcal broncho-pneumonia which quickly responded to drugs. She was found to be a high-grade mental defective. The plantar response was extensor and bilateral choroido-retinitis was present. X-ray examination of the skull revealed fine linear streaks in the region of the optic thalamus. Serum and cerebrospinal fluid inoculations into animals failed to produce *Toxoplasma* infection. The cytoplasm-modifying test was performed by Gard in Stockholm and gave a positive result in a titre of 1 100. Neutralizing tests were performed by Beattie at Sheffield and were positive in both mother and child (the serum of three siblings was negative).

The second alleged infection occurred in a boy of 16 who had suffered from weakness of vision almost since birth. Ophthalmoscopy revealed a condition of old bilateral choroido-retinitis, and radiography of the skull showed several patches of intracranial calcification, two large ones being in the region of the basal ganglia. The cytoplasm-modifying test and the neutralizing antibody test were both weakly positive; the mother's serum was negative.

[The increasing interest taken in this disease will undoubtedly lead to the discovery of similar cases both in ophthalmological and paediatric practice. It is therefore important to try to clinch the diagnosis in suitable patients by recovering the causative organism either during life (by repeated examinations of body fluids or biopsy material) or *post mortem*. Serological tests or clinical findings in the present state of knowledge cannot be accepted as final proof.]

P. C. C. Garnham

WICKHAM, Nancy & CARNE, H. R. **Toxoplasmosis in Domestic Animals in Australia.** *Australian Vet. J.* 1950, Jan., v. 26, No. 1, 1–3. [21 refs.]

" The occurrence of toxoplasmosis in one sheep, one cat and three dogs and in a colony of laboratory rabbits is reported."

JAMES, Dinah M. **A Note on the Use of Free-Living Protozoa as Test Organisms for Drugs.** *J. Pharmacy & Pharmacol.* London. 1950, Apr., v. 2, No. 4, 226–8. [See this *Bulletin*, 1950, v. 47, 161.]

ENTOMOLOGY AND INSECTICIDES: GENERAL

JOHNSON, C. G. **A Suction Trap for Small Airborne Insects which automatically segregates the Catch into Successive Hourly Samples.** *Ann. Applied Biol.* 1950, Mar., v. 37, No. 1, 80–91, 5 text figs. & 3 figs. on pl.

MAILLOT, L. & GRJEBINE, A. Enquêtes entomologiques effectuées en Afrique Équatoriale Française au cours de l'année 1947 par les entomologistes médicaux et vétérinaires de l'Institut d'Études Centrafricaines (Office de la Recherche Scientifique Coloniale) travaillant à l'Institut Pasteur de Brazzaville. [**Entomological enquiries carried out in French Equatorial Africa in 1947.**] *Rapport sur le Fonctionnement Technique de l'Institut Pasteur de Brazzaville en 1947.* 65–92.

The paper contains three notes, on matters of local importance. The first two deal with the mosquito fauna of Brazzaville (46 species) and of Pointe Noire (32 species collected in the dry season); the third note contains a number of locality records on the species of *Glossina* occurring in French Equatorial Africa. *P. A. Buxton*

VARGAS, L. Lista de las especies americanas de *Aëdes*, con referencias a los subgéneros y a la distribución geográfica. [**A List of American Species of *Aëdes* with reference to Subgenera and Geographical Distribution.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Dec., v. 10, No. 4, 327–44. [17 refs.] English summary (6 lines).

TOUMANOFF, C. L'hémophagie variée et l'activité reproductrice chez *Aedes aegypti* L. et *Aedes albopictus* Skuse. [**Variations in Blood Meals and in Reproductive Activity in *A. aegypti* and *A. albopictus*.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 466–70.

In an experiment in Indo-China groups of females of *Aëdes aegypti* and of *Aëdes albopictus* were allowed to feed respectively on man, on a gecko (*Gecko verticillatus*), on a lizard (*Calotes* sp.), on a mollusc (*Achatina fulca*) and on a silkworm (larva of *Bombyx mori*).

Records are given of the length of life of the mosquitoes, the number of feeds they took, the total number of eggs laid by them, the number of batches of eggs deposited and the mean number of eggs per batch. [The total number of mosquitoes used is not given.] The fate of the eggs was watched for a period of eighty days and the percentages are given of the eggs in which the hatching out of the larvae was delayed for more than ten days. These are referred to as " durable " eggs.

The mosquitoes took blood from the gecko and lizard less readily than from man and the blood of these animals was obviously less favourable to them than

human blood for life was shortened; they took fewer feeds and laid fewer eggs in fewer batches. Of those fed on the mollusc *A. albopictus* only matured her eggs. All mosquitoes which fed on the silkworm were dead in twenty-four hours. *H. S. Leeson*

GRENIER, P. & RAGEAU, J. Simulies du Cameroun. [**Species of *Simulium* in the French Cameroons.**] *Bull. Soc. Path. Exot.* 1949, v. 42, Nos. 9/10, 513–29, 10 figs. [10 refs.]

This paper contains illustrated descriptions of the male, pupa, cocoon and larva of two new species of *Simulium* from the French Cameroons, namely, *S. roubaudi* and *S. vargasi*. Descriptions of the larvae of *S. unicornutum*, *S. alcocki* and *S. ruficorne* are completed. Some notes are given on habitats and geographical distributions of these and also of *S. schoutedeni*, previously recorded only from the Belgian Congo, *S. alcocki* var. *henrardi*, *S. palmeri* and *S. damnosum*. *H. S. Leeson*

GRENIER, P. Simuliidae de l'Est congolais (description des nymphes et imagos ♂ et ♀ de: *S. neavei* Roub. (?) et *S. marlieri* n. sp.). [**Simuliidae from the Eastern Congo** (*S. neavei* **and** *S. marlieri*).] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 1/2, 92–100, 2 figs. [16 refs.]

VARGAS, L. & DÍAZ NÁJERA, A. Claves para identificar las pupas de los simulidos de Mexico. Descripción de *Simulium* (*Dyarella*) *freemani* n. sp. de *Simulium* (*Neosimulium*) *encisoi* n. sp. y referencias adicionales sobre *S. anduzei* y *S. ruizi*. [**Key for the Identification of Pupae of Mexican Simuliids.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1949, Dec., v. 10, No. 4, 283–319, 41 figs. on 10 pls. English summary (7 lines).

The English summary appended to the paper is as follows:—

"The authors give a key for the identification of the Mexican pupae of Simuliids that fall in 3 genera, 8 subgenera and 50 species. They also describe *Simulium* (*Dyarella*) *freemani* n. sp., and *Simulium* (*Neosimulium*) *encisoi* n. sp., from the States of Oaxaca and Hidalgo respectively. The authors present the external morphological characters of the male and female of *S. anduzei* and of the male of *S. ruizi*, and add observations on the biology of the species."

SACCÀ, G. Stadii preimaginali di *Phlebotomus perfiliewi* Parrot, *P. papatasi* Scop., *P. perniciosus* Newstead (*Diptera, Psychodidae*). [**Early Stages of** *Phlebotomus perfiliewi*, *P. papatasi* **and** *P. perniciosus*.] *Riv. di Parassit.* Rome. 1950, Mar., v. 11, No. 1, 43–54, 6 figs.

The English summary appended to the paper is as follows:—

"The author had the opportunity to observe all the early stages of *Phlebotomus perfiliewi*, *P. papatasi* and *P. perniciosus*, which he reared in Laboratory. After a description of the early stages of *P. perfiliewi*, which were up to date still unknown, he points out the differential characters of the three species and draws out the keys on the egg, larval and pupal stages."

HERTIG, M. **The Type of** *Phlebotomus mascittii* **Grassi (Diptera, Psychodidae).** *Bull. Entom. Res.* 1950, Feb., v. 40, Pt. 4, 453–7, 3 figs. [14 refs.]

FREEMAN, R. B. **A Check List of the British Siphonaptera, with Comments on the Nomenclature.** Reprinted from *Entomologist's Monthly Mag.* 1950, Jan. 15, v. 85, 14–22. [Numerous refs.]

CHABAUD, A. G. Sur la nutrition artificielle des tiques. [**Artificial Feeding of Ticks.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 1/2, 42–7, 1 fig. [14 refs.]

The author describes a method of feeding ticks which avoids the complicated apparatus necessary for artificial membrane techniques. The tick is fixed by its dorsal surface to a sheet of glass with a drop of paraffin and the three posterior pairs of legs are immobilized in the same way. The mouthparts are then inserted into a capillary pipette. The palps are laterally deflected to lie outside the tube, and better results are reported when the chelicerae too are deflected and only the hypostome allowed to lie in the pipette. The pipette is then filled with whatever fluid the experiment demands and the whole preparation is placed in a moist atmosphere at 27°C.

The author has fed various Ixodidae with water, physiological saline, coelomic fluid and defibrinated blood, and in all cases the degree of engorgement was the same, males engorging in 12–18 hours and females in 18–48. However, males failed to copulate, no female laid eggs nor did any nymphs moult after such a meal. In many Argasids it was impossible to insert the mouthparts into a pipette because the cheeks of the camerostome got in the way. A nymph of *Ornithodorus moubata* apparently fed satisfactorily and survived nearly five months, but did not moult until allowed to engorge on a guineapig.

The author points out that although his method does not allow the artificial rearing of ticks, an experimenter is able, by this technique, to infect ticks with any organism whatever, without using an infected host animal. *J. H. Sudd*

SMITH, C. N. & KING, W. V. **Field Studies of Tick Repellents.** *Amer. J. Trop. Med.* 1950, Jan., v. 30, No. 1, 97–102.

Field tests of 43 compounds were carried out in South Carolina and in Texas; in both places the dominant tick was *Amblyomma americanum* L. The efficiency of each compound was measured as $100 \frac{(N-T)}{N}$ where N is the number of ticks found on subjects wearing untreated uniforms and T the number on subjects wearing treated uniforms. The repellents were applied to twill fatigue suits, either as acetone solutions or emulsions, at the rate of 2 gm. active ingredient to the square foot, or as dusts, containing 2·5 per cent. active ingredient in pyrophyllite, at the rate of 0·1 gm. active ingredient to the square foot. The compounds were tested both in daily wear and in intermittent wear—once each week.

The compounds were divided according to the results of pharmacological tests on rabbits. Some were considered safe, at the dosage used, for use both on clothing and skin, others safe on clothing but irritant or toxic on skin and some unsafe on either; three compounds were of undetermined toxicity. Of the first group the best were hexyl mandelate and indalone, which had an efficiency of 93–99 per cent., both in daily and intermittent wear. Dimethyl carbate, 2-butyl-2 ethyl-1,3-propanediol, 2-phenoxyethyl isobutyrate, ethyl beta-phenylhydracrylate and diethyl phthallate are described as promising. In the second group, the two best repellents, N-butyl acetanilide and 2-[2-(2-ethylhexyloxy)ethoxy]ethanol irritated the skin of some subjects. All the compounds considered unsafe for use on clothing were highly effective. None of the compounds of unknown toxicity was of outstanding efficiency. In some cases acetone solutions gave more effective impregnation than emulsions did. The light dosage given by the dusts cannot fairly be compared with other applications, although fair to good protection was obtained with Indalone and 2-[2-(2-ethylhexyloxy)ethoxy]ethanol dusts.

Texan ticks attached less readily and the efficiency in terms of unattached ticks was higher there than in South Carolina. In South Carolina the repellents appeared to be more effective against nymphs than against adults.

J. H. Sudd

ANDREWS, J. M. **Advancing Frontiers in Insect Vector Control.** *Amer. J. Pub. Health.* 1950, Apr., v. 40, No. 4, 409–16. [40 refs.]

A general review and discussion.

GOLDACRE, R. J. **Surface Films on Natural Bodies of Water.** *J. Animal Ecology.* 1949, May, v. 18, No. 1, 36–9.

This paper deals with the measurement of the surface pressure of films on natural water in England, their origin and nature, and the use of the film made by small organisms for locomotion and food.

Surface films were detected on practically all natural water investigated, during the autumn of 1946, in various parts of England. The surface tension lowering, *i.e.* the surface pressure (F), in dynes per cm. of the film, was measured *in situ* by use of a series of oils of graded spreading pressures. By placing drops of these oils on the surface in the order of ascending spreading pressures until an oil expanded against the natural film, the limits within which the pressure lay could be observed. Unfortunately two of the oils used were oleic acid and castor oil, which, as indicated by ADAM [this *Bulletin*, 1946, v. 43, 255] suffer from the disadvantage that their spreading pressures vary with the *p*H of the water ; and this may here have given slight errors.

However, in general the lowest pressures were found in rivers and streams, and the highest in stagnant pools and lakes. This is due to moving water constantly being swept by the wind and by floating barriers. Measurements showed that F on a downstream side of a stationary but floating barrier was close to zero, and on the upstream side diminished from above 30 at the barrier to near zero a few dozen yards away. Wind has a large effect on F. The change in spreading pressure in the direction of a 6 m.p.h. breeze was about 1 dyne/cm./ft. Thus the value of F at the edge of a 100 ft. lake with such a breeze would be sufficient to collapse the film. Therefore it is not expected that a film could exist on the whole of a large lake or sea.

The films were probably protein or lipoprotein derived from animals in the water, and decomposing plant tissue. They could be collapsed into fibres similar to those formed in the laboratory from collapsed monolayers of protein and lipoprotein. Most spreading substances and lubricating oils gave much more brittle fibres or collapse structures incapable of mechanical handling. Further evidence showing that solution of plant material was adequate to explain the films, was that the filtrate from freshly fallen leaves covered with water for three days, when swept clean, showed a rising value of F from zero to over 30 dynes per cm. at a rate of $1\frac{1}{2}$ dynes/cm./min.

The presence of these films explains why oil used in controlling mosquitoes sometimes does not spread effectively on water, especially in swamps where there is much decaying vegetation. The surface film is grasped by small animals when they move, and certain freshwater snails drawl upside down along the under-surface of the water. The film in such places had a value of $F > 10$, and if very much less the animals would shed a monolayer from the material of their bodies to raise the surface pressure. Large numbers of small organisms were found in the film scraped from the surface of lakes, and it may provide them with a source of food. Larger organisms may feed on this film with its micro-organisms as was shown when tadpoles kept in an aquarium containing soil, aquatic plants and animals were each observed to eat it at a rate of $\frac{1}{2}$ sq. cm. per second.

T. E. Fletcher

KRUSE, C. W., HESS, A. D. & LUDVIK, G. F. **The Performance of Liquid Spray Nozzles for Aircraft Insecticide Application.** *J. National Malaria Soc.* 1949, Dec., v. 8, No. 4, 312–34, 8 figs.

The characteristics of spray clouds may be determined by examining droplets collected on glass slides (either by settling or impaction on waved slides). The numbers of particles in arbitrary size categories are counted, after measurement of the spread factor of standard droplets. The number of droplets counted must never be less than 200, and the droplets must be a representative sample of the spray cloud. For convenience and for comparative purposes, the drop-spectrum obtained in this way is represented by a kind of average value ; usually the mass mean diameter (MMD) is used. The authors, however, consider that an improved and more reliable statistic was found in recently discovered Japanese work ; this is D_o, being the diameter of a droplet with the same ratio of surface to volume as a representative sample of droplets of the spray. This D_o is less disturbed than the MMD by the inclusion of a few, chance, large droplets. The authors describe how it can be calculated from typical data.

The minimum amount of DDT to kill a large *A. quadrimaculatus* larva has been shown to be contained in an *aerosol* droplet of 55 μ (25 per cent. DDT) ; a similar amount would be present in a *spray* droplet of 70 μ. The authors conclude that droplets of 70 μ are optimum, and that, to be effective, several must fall per square inch of water surface [why ? could they not contain a spreading agent ?]. With a good spray cloud, 0·0005 lb. DDT per acre is effectively larvicidal in open water and 0·005 lb. where vegetation is present. The analysis of various types of spray cloud show that these conditions are fulfilled over the central 100 ft. of an aerial spray swathe with clouds characterized by D_o values of 70 to 150 μ. Next, the lateral distribution of spray particles is considered (assuming perfect weather conditions). The theory indicates three types of spray cloud : (1) With small particles (D_o 0–50 μ) wide swathes are produced, but the cloud is very sensitive to wind. (2) The 50–100 μ ranges give a good swathe, less sensitive to wind. (3) At 100 μ and over, the swathe is narrow and there is overdosing in a central peak.

Considering the factors affecting droplet size from spray nozzles, it is clear that the amount of extra surface produced in atomizing is proportional to the energy expended. The pressure on the liquid and the orifice size determine the issuing velocity which results in the fragmentation of the liquid by the air friction. An empirical equation was derived for a number of nozzles, relating D_o and viscosity (μ), surface tension (σ), specific gravity (ρ) and liquid velocity (V).

$$D_o = 5300 \left(\frac{\mu\sigma}{V\rho}\right)^{1\cdot06}$$

The results indicated the considerable importance of viscosity.

Tests with flat sprays and hollow cone jets gave rather similar D_o values for the same outputs. It was interesting to note that *smaller* drops were produced by *larger* output nozzles with bigger orifices.

Experiments were made in nearly calm weather to determine the distribution of deposits (mass and droplet numbers) across the swathe left by an aeroplane. The mass distribution shows two peaks about 50 ft. from the line of flight ; the particle number curve is more uniform. The bimodal curve of mass is more pronounced with large than with small particles.

Some experiments were done to determine the effects of direction of the spray jet on the spray cloud characteristics. If the jet was directed forward (on a moving vehicle or airplane) the D_o decreased very slowly with increased speed

of flying. If the jet was directed backward ("trailing") the D_o increased rapidly as the relative air speed approached the velocity of projection of the liquid; at higher speeds the air-liquid difference became greater, causing greater air friction and better atomization—so that D_o fell. But D_o of a "trailing" nozzle is always above that of a "heading" jet.

J. R. Busvine

TARZWELL, C. M. **Effects of DDT Mosquito Larviciding on Wildlife. V. Effects on Fishes of the Routine Manual and Airplane Application of DDT and other Mosquito Larvicides.** *Pub. Health Rep.* Wash. 1950, Feb. 24, v. 65, No. 8, 231–55, 2 figs. [14 refs.]

This report continues former papers [this *Bulletin*, 1948, v. 45, 46; 1950, v. 47, 569].

Toxicity of DDT applications to fish is strongly affected by the type of pond and the solvent used. No. 2 fuel oil and Velsicol NR 70 are highly toxic to fish, and kerosene is recommended as a solvent. Mortality is greater in sandy ponds than in those where the bottom is muddy or weedy. Weekly applications of DDT at 0·1 lb. per acre are harmful to fish. Oil solutions at 0·05 lb. DDT per acre are recommended for general use. No marked inhibition of vegetation was observed as a result of this treatment. *J. H. Sudd*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

i. MACLEAN, G. **Medical Administration in the Tropics.** *Brit. Med. J.* 1950, Apr. 1, 756–61.

ii. BRITISH MED. J. 1950, Apr. 1, 775. **Health Administration in the Colonies.**

i. Dr. Maclean's excellent article deals with medical conditions in Tanganyika Territory and in Trinidad and Tobago. The author has had a very wide experience of administration in the Tropics.

When the British took over the administration of German East Africa (as it was then called) the effects of war of 1914–18 were devastating and were followed by a pandemic of influenza and by extensive famines, such medical services as the Germans had developed having almost completely disentegrated. A British medical department was gradually built up, but even in 1921 a medical officer, assisted by a few sub-assistant surgeons, compounders and dressers might find himself responsible for the care of a quarter up to half a million people. Indigenous forms of medicine and public health were widely used, and witchcraft, especially in the case of leprosy, was commonly followed. Ritual murders were common.

At the end of 1921, the medical staff was as follows: Headquarters—Principal Medical Officer (later known as Director of Medical Services and before this becoming an "*ex officio*" member of the Legislative and Executive Councils). In addition to these duties he was President of the Medical Registration Board and Chairman of the Central Town Planning and Building Committee. One Medical Officer was appointed as Deputy Principal Medical Officer (later known as Deputy Director of Medical Services), one as Senior Sanitation Officer (later known as Deputy Director of Sanitary Services). One medical officer was appointed in charge of the laboratory, but an analytical chemist was not appointed until later. The central medical store was the distributing base for medical supplies. The station units were the basic units

of the department and were usually under charge of medical officers. There were 23 station medical officers (including senior medical officers and two medical officers of health) and 21 sub-assistant surgeons with their ancillary staff to deal with the diseases met with in a country of over 350,000 square miles. The few missions and private practitioners concerned themselves almost entirely with individual cases, except that some missions gave considerable assistance in looking after leprosy settlements.

The first special unit formed was the sleeping sickness control branch in 1926, the necessity arising from the fact that Rhodesian sleeping sickness had, for the first time on record, appeared in epidemic form. One of the features of this unit was the opportunities that it gave for inter-departmental collaboration.

Later on research units for sleeping sickness, malaria, and tuberculosis were formed. Special interest was attached to the work of the sleeping sickness research unit, which showed that the trypanosome of Rhodesian sleeping sickness could pass from man through tsetse, game, and again through tsetse and remain infective to man [see CORSON, this *Bulletin*, 1935, v. 32, 352]. An institute for production of calf-lymph smallpox vaccine and a training school for dispensers, who were taught the diagnosis (including microscopical diagnosis) and treatment of some common diseases, were set up. The post of Provincial Medical Officer was created about 1935–1936, and although these officers were responsible advisers on health matters to the Provincial Commissioners, they were still directly responsible to the Director of Medical Services. This review covers the period up to 1938 only, when the Director of Medical Services ceased to be an *ex officio* member of the Executive Council, but continued on that body as a nominated member. He also continued as a member of the Legislative Council. The rudiments of a Native Authorities' medical service began with the introduction of tribal dressers, trained in the Government Hospitals. Their standard of efficiency at first was very low and their equipment scanty.

Up to 1938 the dental department was limited to two regular dental officers and a dental mechanic.

An interesting history of the medical services in Trinidad and Tobago, covering a period of 130 years, has recently been written by Dr. Roul Seheult in 1948, formerly resident surgeon at the Colonial Hospital, Port of Spain. The administrative system in 1937 consisted of certain statutory bodies which were responsible for the laws relating to public health and to the professions of medicine, dentistry, pharmacy and midwifery; of a health department of the central Government; and of certain health services provided by municipalities. The chief statutory bodies are the Central Board of Health, the local health authorities, which are subordinate to the above, and the Medical Board of Trinidad. There is also an advisory committee to advise the Director on matters of policy. The city of Port of Spain has its own medical officer of health, who is not responsible to the Director. Generally the Central Board of Health has wide powers. The two Colonies had relatively a much larger staff than Tanganyika. At the end of 1946, the establishment of registered medical practitioners in the health department was 101 (though actually a large number of posts were vacant). At the beginning of 1939 Tanganyika, with a population more than eight times that of Trinidad and Tobago had an establishment of 50 registered practitioners, and of the various grades of assistant and sub-assistant surgeon 55.

If (as it should do) health education is to play a significant part in the attainment of bodily and mental health in the tropics, it is clear that investigation will have to be carried out to see how best to teach and to assess results. Expert knowledge on social anthropology and psychiatry is essential. The

author stresses the need for special training for medical officers going to the tropics in these and allied subjects, in addition to the ordinary post-graduate clinical courses. It is still debated whether the officer administering a hospital should be medically qualified or a layman. [The reviewer thinks that it should be the former provided that he makes administration his primary duty.] If medical administrators are to keep this close touch with their own and allied professions, lay assistance of a high order must be developed.

ii. A vigorous leading article in the same number of the *Journal*, underlines the points emphasized by Dr. Maclean. *C. F. Shelton*

CAMERON, T. W. M. **Tropical Medicine Education.** *J. Assoc. Amer. Med. Colleges.* 1949, Sept., v. 24, No. 5, 305–9.

CAMERON, I. G. **West Coast Recollections.** *East African Med. J.* 1949, Oct., v. 26, No. 10, 292–9.

Though not a scientific treatise, this paper contains much of interest to the doctor practising in Africa as it refers to the impact of West Africa on the non-immune servicemen in the early years of the late war. The frequency of malaria, the handling of the patient suffering from blackwater fever, the treatment of amoebic dysentery and its complications, the variable manifestations of yaws in the African and the bewildering array of parasitic diseases affecting him, are some of the subjects referred to in retrospect by the author, a medical specialist in a military hospital. He is convinced from personal experience of the existence of two mental conditions. West African " juju " does exist and is beyond the ken of the European. For want of an official name the second mental condition was called " furore tropicale ", which developed in European service people towards the end of their West African assignment and was characterised by violent reactions to ordinarily slight and unnoticed stimuli, reactions that would never be allowed to come to the surface in normal every day life in Britain, among family and friends ; senior officers with responsible appointments seemed prone to it ; the lost mental balance was regained during the voyage to Britain.

The author pays special tribute to the army nursing sisters, who worked well, willingly and skilfully, often under difficult conditions, and cites instances of astuteness of observation which proved of considerable value to the physician.

R. Ford Tredre

CAMERON, T. W. M. **Sir William Osler and Parasitology.** *J. Parasitology.* 1950, Apr., v. 36, No. 2, 93–102.

BOOK REVIEW

SLUITER, C. Ph. **De dierlijke parasieten van den mensch.** [The Animal Parasites of Man.] 5th Edition revised by N. H. SWELLENGREBEL & J. E. W. IHLE. pp. viii+441, 318 figs. & 3 coloured pls. 1948. Amsterdam : Scheltema & Holkema's Boekhandel en Uitgeversmaatschappij N.V. [37*s*.]

This standard Dutch textbook of medical parasitology, which is now in its fifth edition, has been revised and brought up to date [to 1948] by Professors Swellengrebel and Ihle. An introductory section deals with the general principles of parasitism and the host-parasite relations between man and his

entozoic fauna, including immunity to parasitic diseases. This is followed by parts devoted to the Protozoa (106 pp.), Platyhelminthes (129 pp.), Nemathelminthes (107 pp.) and Arthropoda, including insects (85 pp.).

It would seem that the main object of this book is to give a systematic account of the morphology, life-cycle and host-parasite relationship of the endo- and ecto-parasitic animals living in and on man. These questions, as well as the bearing of the bionomics of the pathogenic forms on the epidemiology of the diseases caused by them, are accordingly considered fully and in an interesting manner, whereas the clinical and therapeutic aspects, and the diagnostic methods, are not dealt with.

The medical reader is thus provided with an adequate zoological foundation for the study of tropical diseases caused by animal parasites, on the one hand, and of arthropods as independent parasites and vectors of parasitic infections, on the other. The book is well illustrated and accompanied by an alphabetical index. References are given as footnotes in the appropriate places throughout the book. *C. A. Hoare*

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